1915
XLIV

FLIGHT

and

The AIRCRAFT ENGINEER

1/-

OFFICIAL ORGAN OF THE ROYAL AERO CLUB

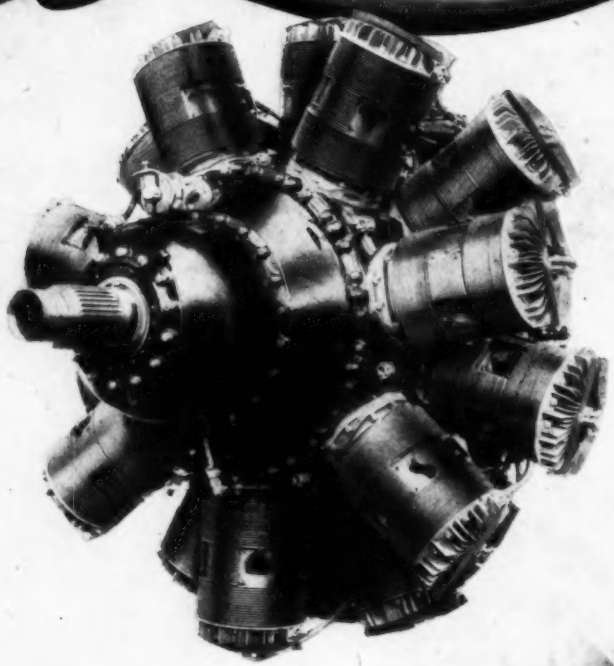
OCTOBER 7th, 1943

RETURN TO

Blackburn
AIRCRAFT

BRITAIN'S POWER IN THE SKIES

"Bristol"



HERCULES

THE BRISTOL AEROPLANE CO., LTD. BRISTOL

FLIGHT and The AIRCRAFT ENGINEER

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

Editor
C. M. POULSEN

Managing Editor
G. GEOFFREY SMITH, M.B.E.

Chief Photographer
JOHN YOXALL

Editorial, Advertising and Publishing Offices: DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1
Telegrams: Truditur, Sedist, London. Telephone: Waterloo 3333 (35 lines).

COVENTRY: 8-10, CORPORATION ST. Telegrams: Autocar, Coventry. Telephone: Coventry 5210.

BIRMINGHAM, 2: GUILDHALL BUILDINGS, NAVIGATION ST. Telegrams: Autopress, Birmingham. Telephone: Midland 2971 (5 lines).

MANCHESTER, 3: 260, DEANSGATE. Telegrams: Iliffe, Manchester. Telephone: Blackfriars 4412.

GLASGOW, C.2: 26B, RENFIELD ST. Telegrams: Iliffe, Glasgow. Telephone: Central 4857.

Registered at the G.P.O. as a Newspaper.

No. 1815. Vol. XLIV. October 7th, 1943. Thursdays, One Shilling.

The Outlook

Foggia

PRESIDENT ROOSEVELT has described the capture of Foggia by the Eighth Army as "one of the most important Allied successes yet from the strategic point of view." He said that the German General Staff had drawn circles around several strategic spots in Europe with Foggia as the centre, and he went on to point out various bombing opportunities which have been brought within the powers of the United Nations by the capture of this place.

In last week's issue *Flight* published a map with circles which also brought out clearly various bombing possibilities. This map was drawn up before the capture of Foggia had taken place, but any reader with a pair of compasses will be able to calculate for himself the places which have been brought within the range of long-range bombers using Foggia as a base. The Rumanian oilfields at Ploesti, for example, are less than 600 miles distant from that base, and the Americans who bombed those fields from a base in North Africa some time ago had to fly very much farther than that to reach them, in fact a round trip of 2,400 miles.

Foggia has, of course, tactical as well as strategical importance, and as the Allied armies advance northwards up the Italian peninsula they will be able to receive fighter cover from some of the airfields round Foggia until they get their grasp on other bases farther to the north. But most important of all, perhaps, is the mastery which Foggia will give over the air above the Adriatic Sea and the Dalmatian coast. British warships will be able to sail far up the Adriatic in perfect confidence that they need not fear the fate of the capital ships lost by air torpedo attack off Malaya. In fact, the possibilities opened up by the capture of this place are almost unlimited.

Quick Returns

AS a result of the battering which the Ruhr has recently received, the Germans are now concerting efforts on measures to develop the munitions output on the Silesian coalfield. A great deal has been done there already, but a still greater effort to make Silesia compensate to some degree for the havoc in the Ruhr is being planned. Breslau in Silesia is roughly the same distance from Italian bases as from Great Britain, but the approach to it from the south cannot be so strongly defended as the northern route. A.A. guns and fighter squadrons can be moved about Germany fairly fast, but the enemy's shortage of fighters must forbid an array of equal strength on all routes. But it must take time before Silesia can be hit as hard as the Ruhr has already been hit.

In the meantime, attacks on German communications give hopes of seriously hampering the German armies. An article on this subject appears on another page of this issue. In addition, the *Daily Telegraph* has been publishing a series of articles by the Swedish journalist, Gunnar T. Pihl, who has recently been expelled from Germany. He says that the German Army in Russia almost collapsed in the winter of 1941 through lack of locomotives. He does not assert that this was wholly due to the damage done to them by the R.A.F., but certainly that must have helped. Attacks on coastwise shipping and inland canals must also help to increase the strain on the railways.

Another hint is given by Mr. Pihl, namely, that it was the Tiger tank which only just saved the German retreat in Russia this year from becoming a rout, and he mentioned four places where these tanks are manufactured, two in Austria, one in Poland, and the Skoda Works in Czechoslavakia. All these places, in addition to com-

munications, are targets which offer a chance of giving quick returns by causing German defeats on the battlefield, and air bases in Italy bring some within short range and offer new lines of approach to others.

Useful Comparisons

AIR CHIEF MARSHAL SIR PHILIP JOUBERT seldom broadcasts a war commentary without telling his listeners something which puts the air war in a new light.

In his talk last week, when he dealt with the help given by Britain to the Russian Army, several striking points were made, and *Flight* may plume itself on having anticipated one of them. This was the effect produced by the prompt announcement day by day of aircraft losses. Both Navy and Army must have lost far more men than the R.A.F. has lost, but, as their casualty lists are published piecemeal and after an interval of time, "the edge of the loss," in Sir Philip's words, "to the nation as a whole is blunted."

Sir Philip recalled that on the opening day of the Somme battles the British Army lost 57,500 men in killed, wounded and missing. If 40 bombers, each with a crew of seven, were the average loss in a raid (which Sir Philip implied was too high an average) we could afford to fight nearly 200 air battles on a large scale before we lost as many men as we did in that one day on the Somme.

The results obtained by 200 such air raids would certainly be of much greater value towards winning the war than what we gained on the Somme. That will be accepted by all, even though the objects of the two struggles were different. The Somme battles were fought with the object of destroying as much as possible of Germany's fighting man-power, whereas the present bomber offensive is intended to destroy Germany's production of weapons.

Sir Philip naturally mentioned that the standard of education in aircrews is higher than in the Army, but he probably surprised most people by stating that now it takes nearly as long to train a good soldier as it does to train a member of an aircrew. In any case, the air offensive is the cheapest way, in lives, of hitting the enemy.

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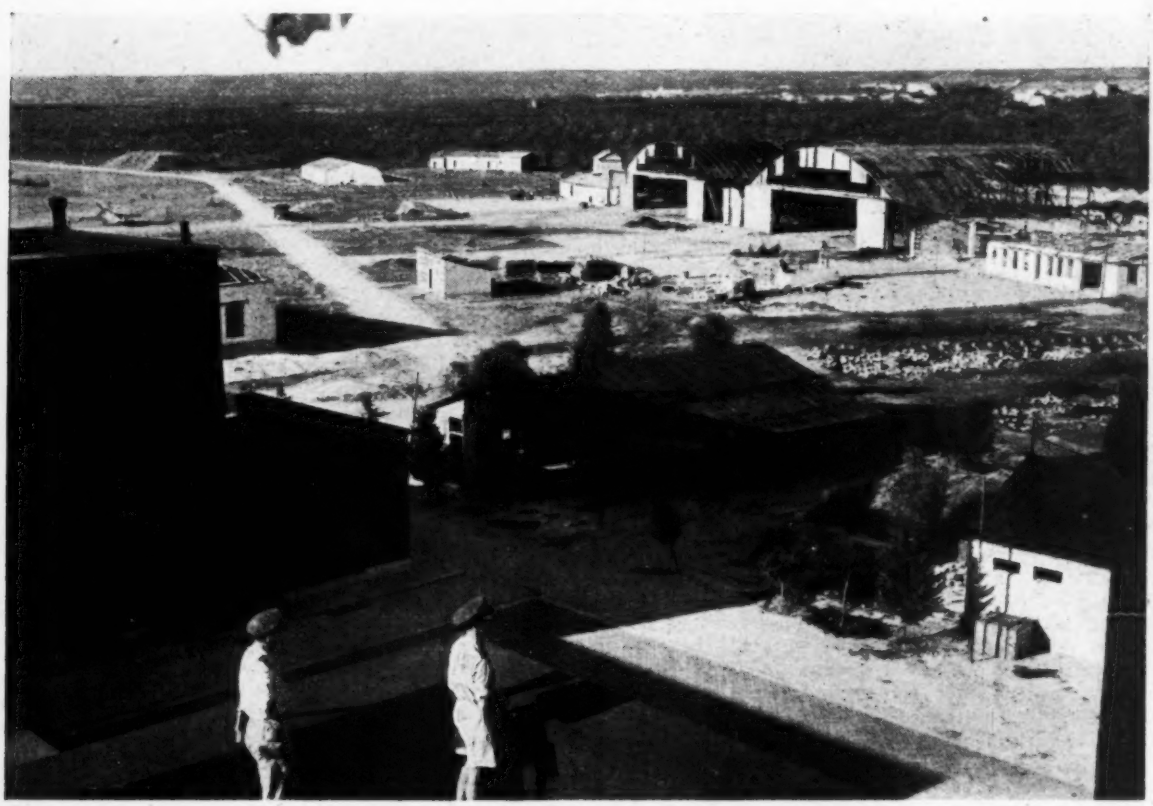


INSPECTING THE DAMAGE : Group Captain Darwin surveys the administration buildings at Grottaglio, near Taranto, from a point of vantage. The allied air attacks appear to have been very effective, but captured airfields are rapidly being put in working order again.

WAR in the AIR

THE CROSS-CHANNEL SERVICE : One of the Mitchell bombers which have been taking a valuable part in the daylight raids on Western Europe touches down at its base in this country after a raid.

Russian Air Force Honoured : Reported Raid on Constanza : Luftwaffe Inactive in Italy : German Fighter Shortage

THE capture by the Russians of Kremenchug, the strong German bridgehead on the left bank of the River Dnieper, has stirred Marshal Stalin to commend the section of the Red Air Fleet under a certain Lieutenant General. This is the first time that the Russian Air Force has been honoured in this way. It suffered much in the early stages of the German invasion of Russia, when it had to face superior numbers, and its pilots and air crews sacrificed themselves heroically in a not unsuccessful attempt to prevent the invaders from securing definite air supremacy.

Since then marvels have been performed. The output of aircraft has been multiplied. The training schools have turned out large numbers of pilots and air crews, and in recent months it has been reported every now and then that the Russians commanded the air on one or another important sector of the front. The advance of the Russian armies and the capture of railways and junctions has made it easier to move squadrons about behind the lines and to mass them at critical points, an advantage which for a long time lay with the Germans.

Independent action in the air has so far been only a minor preoccupation of the Russians, whose military thought is almost entirely concerned with land battles, to which the aircraft must contribute as a form of ancillary troops. Success in such operations depends on the fighters obtaining mastery over their opposite numbers, and so holding the enemy bombers in check and leaving the air sufficiently safe for their own bombers to do their proper work. The Russian success in this has been largely due to the energy with which the Royal Air Force in Britain has kept more than half the total fighter strength of the *Luftwaffe* pinned in the west. That has enormously simplified the work of the Russian fighters.

However, the Germans have recently reported some independent action by Russian bombers, namely, a raid on the Rumanian port of Constanza, which, of course, they say was defeated with loss to the Russians. That

KEEPING THEM FLYING : This Thunderbolt, flown by Capt. G. Johnson, of the U.S.A.A.F., is named *In the Mood*. Johnson has five enemy aircraft to his credit. Note the long-range tank under the fuselage.

WAR IN THE AIR

may be more or less true, for the Germans are very experienced in air defence, and one could not expect the Russian bomber crews to be such masters of air attack as are the crews of R.A.F. Bomber Command. The raid on the Rumanian port is interesting, and is probably connected with the Russian advance in the Kuban and towards the Crimea. It has been reported that the Germans have evacuated some of their troops from the Kuban by sea, which indicates that, though the Russians have regained Novorossisk and other neighbouring ports in the Black Sea and the Sea of Azov, they have not yet been able to establish complete control of the sea round about. The Axis is in possession of Sevastopol, Odessa, and Constanza, and it would be natural for the Russians to strike at these ports in the only way open to them, that is to say by air.

Russian aircraft have also played a more direct part in recent battles. They have been seriously hampering the German retreat from the Taman peninsula to the west of Novorossisk; they have been playing a great part in the Nogaisky Steppe to the north of the Sea of Azov, while parachute troops have been dropped on the west of the Dnieper behind some of the German strong positions on that river.

In the Mediterranean

THE Germans are obviously nervous about the Balkans, and this feeling must have been increased by the activities of the Middle East Command. It has lately been making more frequent bombing raids on airfields in Greece and Crete, and submarines have also been active in the Aegean. The Germans hastened to occupy the island of Corfu off the west coast of Greece, and they sent bombers against the British troops in the Dodecanese island of Cos. Spitfires intercepted these raiders and forced some of them to unload their bombs in the sea.

The Germans also contrived to send such a land force against Split that the Yugoslav patriots who had seized the town had to evacuate it to prevent themselves from being surrounded. They say that they made good their escape with the stores which they had captured. But now that Foggia is in the hands of the Eighth Army, our air power can be exerted against the whole of the eastern coast of the Adriatic, and the embarrassments of the Germans will be accordingly increased. The Royal Navy should also be able to make itself felt in the Adriatic. It has recently been shelling the Germans round Salerno as the Fifth Army pressed them back through the mountains.

The lack of fighter opposition as the forces of General Alexander fought their way towards Naples from Salerno was remarkable. Day after day the Allied pilots reported having seen no enemy aircraft. Presumably the Germans are conserving their limited supply of fighters for the coming major conflict in the north of Italy, and had no wish to lose any of them in a battle which they knew could not be won and was only intended to delay the Allied advance. The German soldiers fought well despite the lack of air cover, though they must have suffered bitterly from it as they left the hills and debouched on to the plain. In spite of German reluctance to risk their fighters in the air, quite a useful number of aircraft of all sorts have been bombed on various airfields.

FOGGIA: The fall of Foggia was described by President Roosevelt as one of the most important Allied successes yet from the strategic point of view. Here is a picture of a direct hit on an ammunition train by a bomb dropped by one of the Flying Fortresses.

Another significant incident was reported from France. Often of late our fighter sweeps have failed to find any enemy aircraft to fight. On one recent occasion, however, the *Luftwaffe* appeared in some strength, and there was a pitched battle in which the Germans lost 20 machines against nine of ours. Our pilots were surprised to notice among the enemy fighters a number of Me 110s. This type has often been used as a tip-and-run raider over the British coast, for which sort of work it is well suited, but it is not at all suitable as a defensive fighter when the attackers are Spitfires. Here again the German shortage of fighters has become very noticeable, and what they have are doubtless being husbanded to meet the invasion from Britain.

Bomber Command

SINCE our last issue Bomber Command has been very active, and on the record are a second attack on Hanover, one on Brunswick, another on Bochum, while the American Eighth Air Force made a daylight raid on Emden. The attacks on Hanover are very interesting on account of the woolcombing industry there. With the winter looming

WAR IN THE AIR

ENEMY AIR LOSSES TO OCT. 2nd

	Over G.B.	Continent	Middle East	N.W. Africa
Sept. 26	0	1	0	0
,, 27	1	21	2	3
,, 28	0	0	0	1
,, 29	0	2	1	3
,, 30	0	0	1	0
Oct. 1	0	1	11	11
,, 2	1	0	3	3
	2	25	18	21

Totals: West, 7,552; Middle East, over 5,722; North West Africa, 3,348.

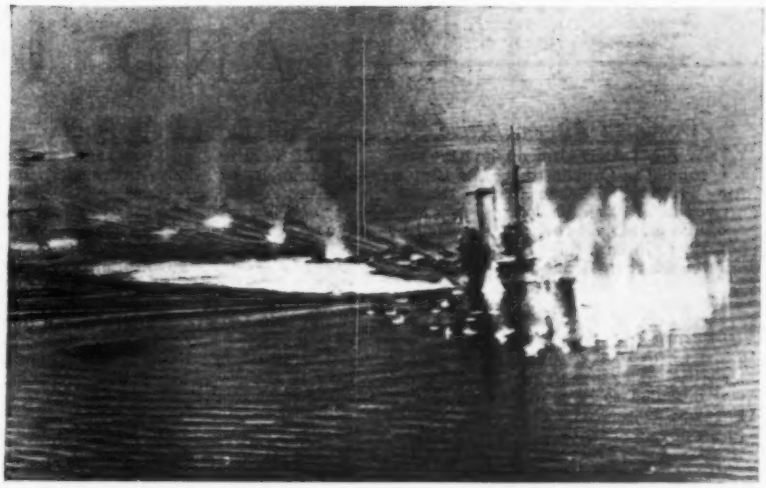
ahead, and especially the Russian winter, woollen clothing has a high degree of importance for the German soldiers.

Our readers will have read in the daily papers about the damage done in Berlin by the raids of August 23rd, 31st and September 3rd. About 100 factories or industrial premises were found by the expert examiners of the photographs to have been damaged, and the list of them clearly proves that these were no mere "terror" raids (as the Germans like to call them) but serious blows at enemy war industry. None the less, the effect on *moral* was considerable, and the Berliners are said to be less hardy in "taking it" than the Rhinelanders are. The evacuation of civilians from Berlin is said to have run into seven figures. That would not ease the strain on the German railways, which are much harder pressed than those of Great Britain. But the Berlin civilians were emphatic that their journeys were "really necessary."

The Strategic Air Force of the North West Africa Army penetrated into Germany last Friday when Fortresses made a daylight raid on Munich. Bomber Command followed this up on the Saturday night by sending Lancasters against the same city, which has thus come under fire from both north and south. It is a foretaste of what the southern parts of the Reich will suffer when the Allies get possession of more airfields in Italy. The attack by the Lancasters was over in 25 minutes.

Rhodes, the chief island of the Dodecanese, has been raided several times by the Middle East Command. The first announcements of the German attack by sea and air on Cos, which we only occupied a few days ago, and which was reported to be only lightly held, looked rather ominous, chiefly because the communiqué said so little. Probably more will be known about the fighting there by the time these words are published. There is nothing surprising in the Germans using aircraft against the island, but for a naval force to venture out into the Aegean is not what one would have expected.

The French have been fighting their way forward in Corsica, joyfully recovering part of their own homeland, for so that island must be considered. It was cheering to hear of French aircraft playing a useful part in the struggle; it shows that the spirit of Georges Guynemer is not dead.



PEPPERING A TUG OFF GREECE: Beaufighters of the Middle East Command have made life unpleasant for many an Axis vessel off the Greek and other coasts. This tug had just left the harbour at Preveza.

ONE OF THE THIRTY: During September 30 daylight attacks and 25 night operations were carried out by Allied air squadrons against the enemy. Here Flying Fortresses are seen dropping bombs on Amiens-Glissy.

MacArthur Presses On

ONCE again a skilful combined operation has put Australian troops ashore at another spot in New Guinea, and to the previous capture of Lae the Australians have now added Finschafen. The landing was opposed by Japanese ground troops, but their Air Force took no part in the opposition. Since then, however, the enemy aircraft have woken up, and medium bombers and dive bombers have been worrying the Australian positions. But the American Army Fifth Air Force is very much in the ascendancy in the South West Pacific.

BRITISH & U.S. AIR LOSSES to OCT. 2nd

	Over G.B. A'crft.	Continent B'brs.	Continent F'trs.	Middle East A'crft.	N.W. Africa A'crft.
Sept. 26	0	0	2	1	0
27	0	46	10	3	0
28	0	0	1	3	0
29	0	8	8	0	1
30	0	0	0	0	1
Oct. 1	0	2	0	0	14
2	0	11	0	0	3
	0	67	21	7	19

Totals: West, 7,850; Middle East, about, 2,201; North West Africa, 1,266.

HERE AND THERE

Dominion Airmen Arrive

NEW ZEALAND airmen who have been trained in Canada under the Empire Air Training Scheme have recently arrived in Britain. The party was a large one, and on arrival they were greeted by Mr. W. J. Jordan, the New Zealand High Commissioner in London.

New U.S. Carrier

ANOTHER aircraft carrier was launched at Camden, New Jersey, recently. It was the *San Jacinto*, which was intended to be a 10,000-ton cruiser, but was converted during construction to an aircraft carrier.

Still Spreading

MORE new airlines are planned by American companies. The civil Aeronautics Board has received application from Eastern Air Lines Co. to operate fourteen new mail, passenger, and cargo services after the war, ten of which are to Latin-America and Canada.

Gifts from India

WITH a message of congratulation to the Royal Air Force on the third anniversary of the Battle of Britain, His Highness Air Commodore the Nawab of Bhopal has placed at the disposal of the Air Officer Commanding-in-Chief, India, the sum of 100,000 rupees to be devoted to purposes connected with the prosecution of the war, and a further sum of 10,000 rupees for providing amenities for units of the Royal Air Force and the Indian Air Force stationed in the Bhopal State.

Beefing-up the Fund

THE Stratford-on-Avon and district branch of the Auctioneers' and Estate Agents' Institute has raised £17,000 for the Institute's Royal Air Force Pilots' and Crews' Fund. At a recent gift auction in aid of the fund the Mayor of Stratford-on-Avon, Mr. Roderick Baker, acted as auctioneer for the first lot, a fat bullock, which, being resold time after time, brought in a total of £10,251.

The Institute's Fund recently handed over to the Royal Air Force Benevolent Fund stock to the value of £75,000.

S.B.A.C.'s New President

MAJOR H. R. KILNER, M.C., has been elected president of the Society of British Aircraft Constructors in succession to Mr. A. F. Sidgreaves, O.B.E., who had been president since November, 1941.

Major Kilner is director-in-charge of the aircraft section of Vickers-Armstrongs, Ltd., whom he joined in 1930, becoming a director in 1936. He is also a director of Cooke, Troughton and Simms, Ltd.

Mr. Sidgreaves, the retiring president, who is managing director of Rolls-Royce, Ltd., becomes deputy president, and Mr. H. Burroughes, a director of the Gloster Aircraft Co., Ltd., has been elected vice-president.

W.A.A.F. Appointment

GROUP OFFICER LADY WELSH has become Director of the W.A.A.F. and is promoted to Air Commandant in succession to Air Chief Commandant Trefusis-Forbes, who has been posted abroad for special duties.

Lady Welsh, who is 47, is the wife of Air Marshal Sir William Welsh. She served in France during the last war, and joined the A.T.S. in 1938, later transferring to the W.A.A.F.

Air Chief Commandant Trefusis-Forbes will remain senior officer of the service. First of all she will go to Canada to study the activities of the women's division of the R.C.A.F. and later will tour North Africa and the Middle East.

Anglo-American Acceleration

MR. DONALD NELSON'S visit to this country to confer with Mr. Oliver Lyttelton has as its chief object the ensuring that our joint productive superiority over the enemy shall be put to the most effective use. The two men are, of course, joint heads of the Anglo-American Combined Production and Resources Board set up early last year.

At the same time Mr. Bernard Baruch, advisory assistant to Mr. Byrnes, U.S. Director of War Mobilisation, has stated to Congress that aircraft production must be augmented by an increase in aircraft workers and plant on the West Coast, otherwise the 1943 programme will fall short at a time when the need is greatest.

But F.D.R. Says—

SOMEWHAT strangely with Mr. Baruch's alarm comes Mr. Roosevelt's cheering assertion that the upward curve of U.S. aircraft production increased in August and was even better last month.

"During the two months of the recess of the Congress," he is quoted as saying, "our factories produced approximately 15,000 aircraft. There was an important increase in heavy bombers in August."

Mr. Roosevelt also stated that since May, 1940, 123,000 aircraft and 349,000 aircraft engines had been produced and delivered "up to September 1st, 1943," and that of these aircraft 52,000 had been produced during the first eight months of 1943.

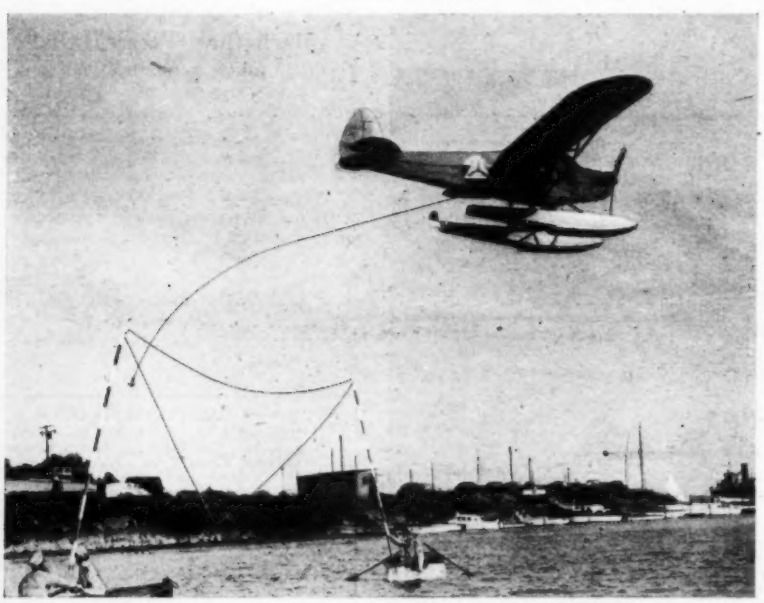
The U.S. Navy Department has also stated that its air forces now have more than 18,000 aircraft compared with 1,744 three years ago.

"First League" Fighters

QUANTITY, however, is not everything, and Mr. Ralph McGill, editor of one of the leading newspapers in the Southern States, who has recently returned to America after a visit to this country, discusses comments on various American aircraft which he heard, not from the British but at U.S. air bases in this country.

Only the Thunderbolt and the Mustang with Merlin engine, he was told, are really up to the "first league" air fighting obtaining in the European theatre, where the Germans have their best aircraft and pilots.

Two other American fighters, he added, had to be shipped out of England, but were doing a good job on other fronts and he did not seek to deprecate them; it was just that they couldn't compete in the "first league."



PISCATORIAL PIPER: This American experiment in a marine application of the pick-up method widely used by the Army's liaison "grasshoppers" must call for nice co-ordination between the pilot of the Civil Air Patrol Piper and the oarsmen. The aerial fisherman, it seems, holds the line in his hands.

"Down the Beam"

Some Impressions of the Navy's Instrument-flying School

By A NAVAL PILOT

I HAVE just returned from a visit to the instrument-flying school which the Navy have established at a Shropshire airfield.

To any pilot who has not had previous experience of "beam" landings the blind approach will always seem like a miracle, particularly when it is made over trees which are yet to be cut down, and is extended to the actual blind landing on a bumpy surface. For the purpose of demonstration the instructor even offered to taxi me back to the hangars before raising his "hood."

The possibilities for making safe beam landings were opened out to me in no uncertain way. After the instructor had shown me what could be done he handed over the controls of his Airspeed Oxford and suggested that I should try it myself. As a "stooge" pilot with a few hours' experience in a Link Trainer, and practically no experience of instrument-flying in cloud, the prospect was frankly terrifying, and I prepared to make a fool of myself, happy only in the knowledge that I had someone beside me who would come to the rescue before I spun in.

Link Trainer Experience

I knew the layout of the beam from Link Trainer experience, and found to my astonishment that it actually worked in the air. The first attempt admittedly left me 150ft. up over the airfield, foredoomed to overshoot, but by taking a little more care and rigidly obeying the instruments, I placed the aircraft within 10ft. of the ground and within a hundred yards of the boundary at the second attempt. Furthermore, it was no fluke.

This would have had little significance if I had been an experienced airline pilot. But as I am no more than a peacetime club flier who has turned his hand to "stooge" flying for the duration, it very strongly suggested that the beam technique was within easy reach of the amateur of the future. This is borne out by the fact that young Fleet Air Arm pilots with less than 300 hours' experience can pass out on the beam in eight days.

The second interesting thing which this school revealed was the low standard of instrument flying which is often displayed by pilots whose flying hours run into four figures, but who have not previously had a special course in the use of their instruments. I shall be saying nothing new when I mention that the ordinary pilot, on finding himself in cloud, is like a cat on hot bricks. His eyes jump from one instrument to the other . . . from the ASI to the turn-and-bank, and thence to the artificial horizon, the altimeter, and the direction indicator. When asked how he does his blind flying, he says by checking one instrument with the other, and keeping a general eye on all of them. And if his eyes are popping out of his head with fatigue at the end of an hour . . . well, that is the inevitable misfortune of blind flying.

Unnecessary Agonies

It took me, perhaps, thirty minutes to realise that all the brief agonies I had endured when forced to fly blind had been unnecessary—that as soon as the relative position of the artificial horizon and, of all things, the boost gauge had been mastered, the rest was easy! There was, of course, more to it than that. But very little!

The application of accurate instrument-flying to the Navy needs no stressing. Operations are carried out in all weathers, and often by night. Any pilot who is taking off in poor conditions of visibility, with ten-tenths cloud and no moon, knows the anxiety of the first few seconds of flight before he has established the trim of his aircraft and settled down on his instruments. It is at such moments that accidents are most likely to occur, and if these can be reduced by a scientific training which makes take-offs executed entirely under the hood seem as easy as take-offs in broad daylight, then the value of such a school as this is obvious. There may be no need for beam equipment to be fitted in every aircraft which flies (on this point I am neither qualified nor encouraged to argue). But there is need for the highest accuracy in instrument-flying, and it is good to know that the means to its attainment is being made available to young Naval pilots within the green oceans of Shropshire under the name of *H.M.S. Godwit*.

A.T.C. NATIONAL RECRUITING CAMPAIGN

IN nearly 2,000 cities, towns and villages throughout Great Britain a great national recruiting campaign for the A.T.C. has begun. The aim is to obtain enough young men of "air crew quality" to maintain the strength of the Corps at its 1943 level of around 180,000 cadets.

"Crews for 1,000 bombers," is how Mr. Wakefield, Director of the A.T.C., put it. "It is quality we want, not quantity. There is no room in the modern A.T.C. for the half-hearted youngster or slacker. The R.A.F. looks increasingly to the A.T.C. to help maintain its flow of air crew candidates. And the young men we are looking for must be potentially up to the high standard expected of candidates for the R.A.F. and Fleet Air Arm for flying duties."

The need for air crew recruits to the A.T.C. is urgent because every week hundreds of cadets in an ever-increasing stream are now entering the R.A.F. and Fleet Air Arm as air crews.

The Air Training Corps is a voluntary part-time pre-service training organisation for young Britons, from the age of fifteen until they join one of the three services for air duties at the age of eighteen or nineteen. Its duty is to ensure that however long the war may last, there will not lack an adequate flow of young men of the quality required to start their air crew training with the Royal Air Force and Fleet Air Arm.

For several reasons the total strength of the Corps has been falling during the past two years. Increased exits to the fighting Services, long hours of work in industry, especially on war work, the black-out and travel difficulties, are some of the causes which have been preventing young men from joining the A.T.C. in the numbers required. It may also be that there is a growing sentiment as victory approaches that the national effort can be allowed to slacken—a view which the Prime Minister and other Allied leaders have recently said something to correct.

This recruiting campaign aims not so much at increasing the total strength of the Corps as to maintain it at a level at which it can continue to fulfil its obligations.

To quote Sir Archibald Sinclair: "Now is the time for us to redouble our efforts and to ensure that the Royal Air Force will be constantly strengthened by a flow of air crews and mechanics with the same careful training which won the victory for Fighter Command in the Battle of Britain and which is even now winning the victory for Bomber Command in the Battle of Germany."

The provision of suitable young men as candidates for air crew duty has been, and still remains, the primary task of the Air Training Corps. Created in war and for the purposes of war, the Air Training Corps has unlocked to the young men of Britain the door of service with the Royal Air Force. Behind that purpose steadfastly pursued ever since was the absolute conviction that this war was going to be won by the side which achieved and maintained complete air domination.

A.T.C. training will also be invaluable to young men in civil aviation after the war, not only as pilots and air crew, but in the trades involved in aircraft maintenance.

Many interesting facts about the A.T.C. are contained in an attractively illustrated booklet issued by the Air Ministry.

R.N.A.F. in ICELAND

NO "DEEP DEPRESSION" HERE : One of the air stations of the Royal Norwegian Air Force in Iceland.

First of New Norwegian Air Force Squadrons Now Transferred to Great Britain : Hardships of Climate and Geography of Iceland : Many Ready to Go Back

"THE first Norwegian Air Force squadron to be formed after the fall of Norway in 1940, equipped with Northrops, has done good work in Iceland." That is how the C.in-C. Royal Norwegian Air Force, Rear-Admiral Hjalmar Riiser-Larsen, laconically summed up the operations of this squadron which has been stationed in Iceland since April, 1941, and which has recently been transferred to Great Britain.

But that is not all there is to tell about these airmen—the pioneers of the new Norwegian Air Force which has been rebuilt since Norway was evacuated in June, 1940. Theirs is a story of hardship and toil in bitter cold and arctic storms; of routine patrols and convoy duties; of hundreds of hours of flying devoid of all excitement but that of running the gauntlet of electric storms, blizzards, gales and thick fog.

This squadron, formed at the beginning of 1941 after months of reconstruction work in "Little Norway," the Norwegian Air Force Training Camp in Toronto, Canada, was the first to go on operations since the Battle of Norway was fought. The crews and ground staff were recruited from the ranks of those who had escaped from Norway by various means, from the merchant and whaling fleets and from Norwegians who were living abroad at the time Norway was invaded. They are from all classes of society, but at their new war station in Iceland their purpose was the same.

"How enthusiastically the ships were unloaded, the planes taken out of their packing cases and assembled," wrote Nordahl Grieg, the well-known Norwegian author, commenting on the arrival of this squadron in Iceland. Air-

HUMAN DE-ICERS : Ground crews of the R.N.A.F. scraping ice and snow off the wings of a Northrop seaplane.

OFF ON PATROL: One of the R.N.A.F. Northrops leaves its base in unusually sheltered conditions.

craft had priority for them, and for months some of the men lived in tents. Barracks could be erected later.

Now it has just been announced that this squadron has been transferred to "somewhere in Great Britain." With the transfer they have been re-equipped with Sunderland flying boats—a big change from the Northrop seaplanes, and the Catalina flying boats which they had received some time after their arrival in Iceland.

In Iceland the men lived in Nissen huts, the walls of which were covered with pictures, and photographs of Norway, the King and aircraft. For extra warmth they bought sheep skins from the Icelandic farmers. Often flying had to be suspended for days on end while great storms raged outside. Huts were surrounded by sandbags and petrol cans filled with earth to prevent them becoming "air-borne." Snow would heap up against the hut sides and in the morning the men would have to dig themselves out.

Maintenance in the Open

It is not only the aircrews who had a tough time in Iceland. The ground crews did not take a back seat. They had to maintain the aircraft in all kinds of weather—and often there were no hangars for the planes; no cover when the men were working. In frost and snow and gales they had to keep the aircraft serviced and ready to take off at a moment's notice. Storms blow over as quickly as they break in Iceland, and there might always be an important convoy to cover.

The sea is usually so rough that the machines can never be left to ride at anchor, even in the comparatively sheltered fjords. Thus when an aircraft becomes water-borne, "flat pilots," as they are called, must go out to them in dinghies, climb on to the floats, fix landing wheels and then pilot the machine to the shore. Although they wear protective rubber clothing there is hardly an occasion when they do not get soaked by the icy water, and often there is thick ice to contend with. Once ashore, the machines must be tied down securely, and engines must always be kept warmed-up.

This Norwegian squadron alone has escorted many hundreds of convoys and made numerous attacks on U-boats, while they are credited with a number of "probable" enemy aircraft destroyed. Snooping long-range German flying boats have learned to respect the Northrops and the men who fly them.

A Norwegian flying officer, a pilot, recalled some of the difficulties they had in Iceland. For some months he served with one flight of the squadron which was stationed in a fjord on the east coast of Iceland. "One of the main difficulties," he said, "was that because the fjord was flanked on either side by 3,000ft. high mountains, the wind only blew in two directions—either in or out of the fjord. Thus if the wind was off-shore aircraft had to be taxied out into the fjord and a short run made into the wind and straight towards the mountains. Often we cleared the cliff face by only about 50ft. or so. Sometimes, because of the crazy air currents and pockets, you would find your machine skidding towards the mountain face, and you were unable to do a thing. Then at the last moment it would come under control again.

"Similarly," he went on, "if the wind was in-shore and you wanted to land you had to fly inland, make a steep turn under the lee of the mountains, and then drop down into the fjord."

Fog Navigation

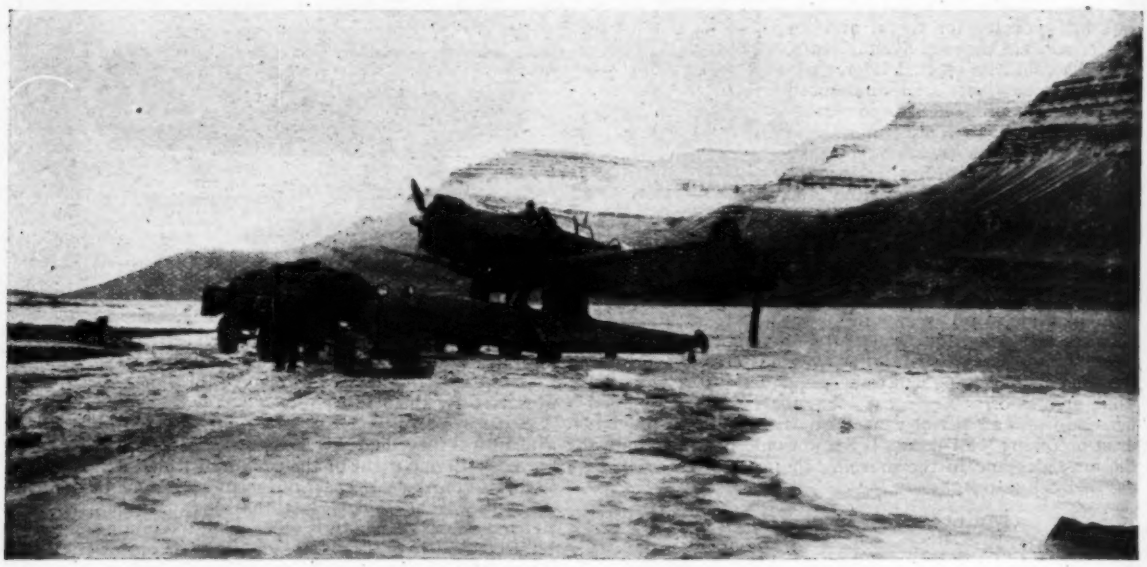
Fog is the biggest danger, however, in Iceland. "You can take off in perfectly clear weather," said the pilot, "but when you come back after a few hours' patrol everything is as thick as pea soup. In this place where we were, magnetic conditions and atmospheric disturbances were such that the radio was no good. Thus it was never possible for us to be guided in by radio. We just had to rely on our own judgment and hope for the best."

During the daylight period, when there were convoys to be protected, it was necessary to work all the 24 hours. A pilot who had been down for a short sleep asked the mechanics who had been working unceasingly for sixty hours whether they could last out any longer. The defiant reply was: "So long as you can keep the crates in the air we will keep order on the ground." That characterises the spirit of all the Norwegians who served in Iceland.

Although there was only a village containing about 200 people in this fjord, with no amusements at all, many of the Norwegians did not want to leave when they were due for relief. It was enough, they thought, that there was plenty of work for them, with ski-ing, mountain climbing

A CALIFORNIAN IN ICELAND: The Catalina at her moorings amid the ice floes. Open lanes are not plentiful near the shore.

ROYAL NORWEGIAN AIR FORCE IN ICELAND



CHILLY WORK: A Northrop seaplane being refuelled on the beach in readiness for another patrol.

and occasional hunting as a pastime. Some of them stayed as long as 15 months, perfectly happy to live this life. Any one of them would return to-morrow with pleasure.

Incidentally, it is interesting to note that the Norwegian training camp is no longer at Toronto, where an airport was hired from the Canadians. "Little Norway" is now in Ontario, at a place called Muskoka, which is the old Indian name for Heaven.

This new training camp is situated in the midst of a pine forest, a few miles away from the shores of Lake Muskoka, and the land has been bought by the Royal Norwegian Government. Formerly it was used as an elementary training centre, but now Norwegians who escape to join the Air Force will be trained here for any job—from learning to fly to learning to cook.

The new camp has been constructed on typical Norwegian lines, the whole place having been designed by a Norwegian architect. The timber for the buildings has been cut from the forest, and the whole scene is remarkably reminiscent of Norway itself.

It is here that Norwegians are being trained to augment the existing squadrons which are operating in the European theatre of war. One of the two Norwegian Spitfire squadrons is still Fighter Command's top scorer, a record it has held since March. Although both squadrons have been engaged in operations for only just over a year, they have between them shot down more than 100 German aircraft, with scores of "probables" in addition. The 100th "kill" was made by a 24-years-old Flight Commander (his name cannot be given), who, fittingly, was one of the original 120 men. By "bagging" two more German machines since he shot down the 100th, his score now totals 6 and one-third. He shared one E.A. with two other pilots.

This Norwegian captain escaped from Norway to Britain, and went with 119 other Norwegians to Canada, where they began the R.N.A.F. reconstruction at "Little Norway"—the Air Force Training Camp at Toronto.

Two or three days after the young captain shot down this 100th machine he brought down the R.N.A.F.'s 103rd and 104th enemy aircraft.

The two Coastal Command squadrons have not only maintained the important routine work, but have dropped well over 200 tons of bombs on German targets, while the Norwegians working in Bomber Command have dropped many more bombs on Germany than the Germans ever dropped on Norway. Norwegians are, in fact, paying back the Germans for what they did to Norway with compound interest.

AMERICANS AT EMPIRE CENTRAL FLYING SCHOOL

THREE leading figures in the United States Army Air Force Training Command have completed a course at the Empire Central Flying School, and have expressed their satisfaction at the benefits derived from an interchange of information on training methods with representatives of the air forces of the British Commonwealth. The American visitors were Lt. Col. F. H. Miller, Director of Ground Training at the U.S. Central Instructors' School, Randolph Field, Texas; Lt. Col. Schmid, Assistant Director of Training, Central Instructors' School; and Capt. Cooke, of the Instrument Flying School, Bryan, Texas.

The school can be described as a "university of flying," and the American visitors, each of whom used the trip to good advantage by flying a Marauder across the Atlantic, met expert fliers from the R.A.F. and the British Dominions ready to share the fruits of their practical experience.

The course consists not so much of instruction as a pooling of experience and ideas on training methods, supported by a theory of flight and the opportunity of individual research work; and the students, each of whom must be an experienced instructor, take part on debates on training methods and visit operational stations.

The U.S.A.A.F. has no institution which is quite comparable to the Empire Central Flying School. It is considered an honour in the flying world to be invited to take the course, and a graduation certificate is regarded as the hall-mark of good flying.

Canada was also strongly represented by ten officers on the course which has just concluded, and two of them gained special distinctions and one a distinguished pass. In addition, the present chief instructor and two of the instructors on the course were Canadians.

Behind the Lines

Service and Industrial News from the Inside of Axis and Enemy-occupied Countries

Jap Designation

WHILE the Japs did their best to hold back any information on their aircraft, lack of standard nomenclature in Allied reports has helped to keep up that air of mystery. The Japanese method limits aircraft names to numbers, which stand for the two last figures of the Japanese year in which the type came into service. Thus all aircraft which came into service in 1940 (2600 in Japanese reckoning) are named 00.

For the past eight months Allied pilots in the Pacific war theatre have been using their own pet nomenclature which is now being included in the agreed standard designation of Jap types. Although somewhat frivolous these names, which are listed below, will fulfil a most useful purpose and stop the existing confusion.

NAVY TYPES.

Zeke: 00 Mitsubishi, single-seater fighter.
Hap: 00 Mark 2 single-seater fighter.
Nell: Mitsubishi 96 2-engined heavy bomber.
Kate: Nakajima 97 single-engined torpedo-bomber.
Val: Aichi 99 single-engined dive-bomber.
Betty: Mitsubishi 01 2-engined heavy bomber.
Rufe: 00 reconnaissance floatplane.
Mavis: Kawanishi T.97 4-engined flying boat.
Emily: T.02 4-engined flying boat.
Pete: Sasebo 00 floatplane.

ARMY TYPES

Dinah: 00 reconnaissance fighter.
Oscar: 01 Nakajima single-seater fighter.
Sally: Mitsubishi 97 Mark 2 2-engined heavy bomber.
Lily: T.99 light bomber reconnaissance.
Helen: 00 2-engined heavy bomber.

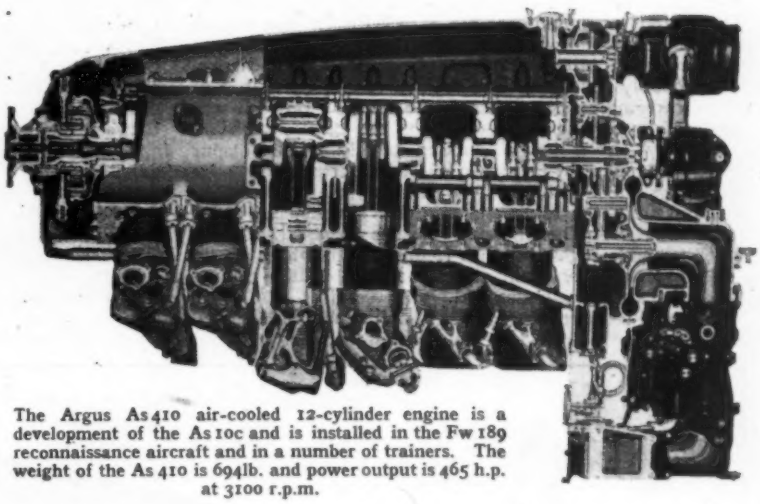
Experiments in G

OVER 200 experimental flights to study the effect of acceleration have been made with a specially equipped Ju 87. The aircraft carried two passengers, the test subject and observer, th former seated in an upright position facing direction of flight, the latter facing him.

In 80 per cent. of the 22 subjects tested blackout set in at 5.5 g; in 50 per cent. at 6.75g, and in 20 per cent. of the cases at 7.5g.

About two-thirds of the subjects tested were able to withstand acceleration of the order of 8 to 9g by adopting a crouching position. In prone position centrifugal tests have shown that as much as 15g can be withstood for 2 mins., although breathing becomes very difficult.

Another interesting point of these observations is that in higher altitudes with increasing lack of oxygen, resistance to acceleration drops rapidly and collapse may occur in 2 to 3 seconds at 3g.



The Argus As 410 air-cooled 12-cylinder engine is a development of the As 10c and is installed in the Fw 189 reconnaissance aircraft and in a number of trainers. The weight of the As 410 is 694lb. and power output is 465 h.p. at 3100 r.p.m.

Quick Work

THE Rumanian Home Broadcasting Service announces that, for the first time, pilot's certificates have been awarded to 24 pupils of the Rumanian Flying School at Odessa.

It is worth noting that the course of training lasts only two months.

Italian Loss

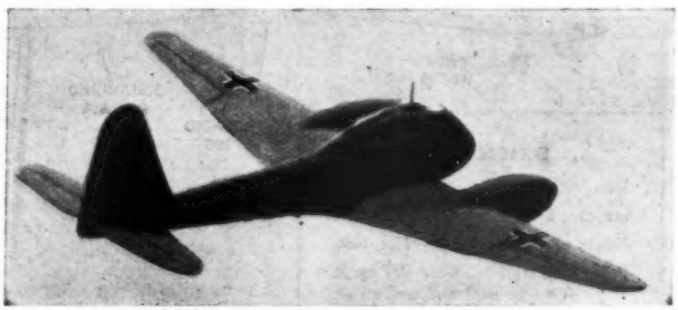
FROM Switzerland it is reported that Colonel Ivo de Vittembeschi, one of the best known officers of the Italian Air Force, has been killed in an aircraft accident. Colonel Ivo de Vittembeschi participated in the 1933 North Atlantic formation flight commanded by Marshal Balbo, and became technical adviser to the General Staff of the *Regia*.

New German Types—

A NEW Messerschmitt creation is the Me 410, a development of the Me 210. The aircraft made its first debut in June, when it was chased across the Channel and shot down somewhere on the French coast. Identical in its appearance to its predecessor, the Me 410 has been equipped with a more powerful engine, presumed to be either the DB603 fitted on the latest Italian fighter, the Reggiane Re2003, or the DB605, which is also installed in the Me 109G fighter and which develops 1,500 h.p. at 16,400 ft.

The Focke-Wulf Company have also produced a new type, the Fw 290, a somewhat enlarged version of the Fw 190, which is reported to be powered with a twin-row 18-cylinder BMW radial engine of 2,100 h.p. The Fw 290 carries the same four cannon and two machine guns as the Fw 190, but the ammunition load has been doubled, increasing the fire duration of the aircraft.

A modified version of the Fw 190A3, the Fw 190A4, has also made its appearance in the skies of Europe, and is fitted with long-range fuel tanks slung underneath the wings.



The Me 210, the predecessor of the new Messerschmitt Me 410.

—and Japanese

WITHOUT giving any detailed information, the Domei News Agency reports that three new Japanese aircraft types are employed in operations from an unspecified South Pacific base. According to the report the new Shoki fighter derives its name from a mythical Japanese warrior who fought against the demons; the Donryu bomber is said to be designed for long-range operations and adequately armed to operate without fighter escort, and, finally, the third type is a reconnaissance aircraft named Shitei.

Sixty-ninth of the Latest Recognition Series

Aircraft Types and

HOTSPUR (GLIDER)

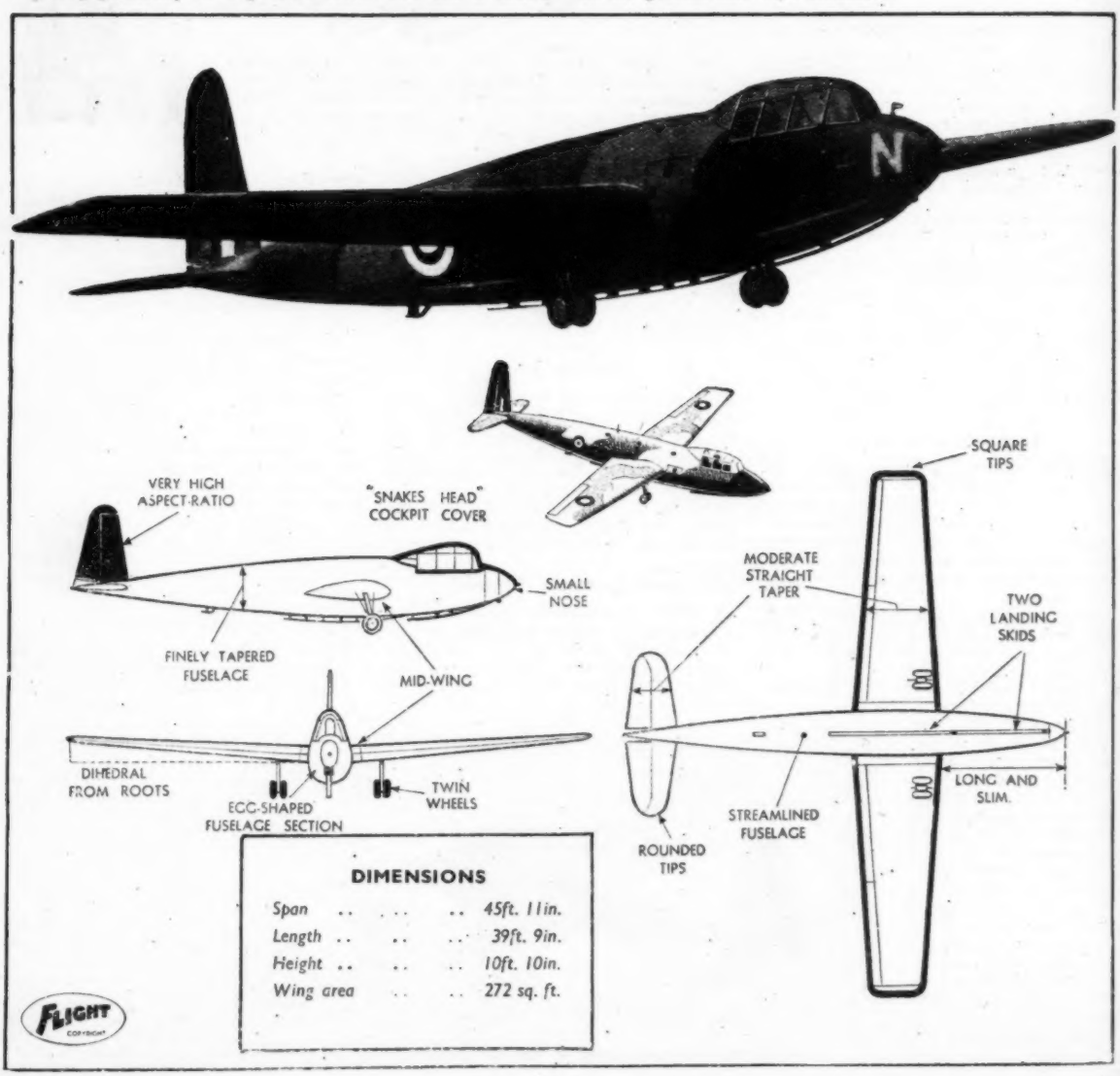
BUILT entirely of wood, with plywood skin, the Hotspur glider is the standard trainer used to instruct glider pilots for the airborne divisions of the British Army, and large numbers are in service in the Glider O.T.U.'s in various parts of the country. The Hotspur was originally intended as an operational troop-carrier, but probably because it was decided to employ gliders of larger carrying capacity on actual airborne "ops," it was allocated to training duties only.

Of very clean design aerodynamically, the Hotspur accommodates eight men, two of whom act as pilots. Its mid-wings are cantilever type with a small degree of dihedral from the roots and straight, symmetrical taper to square tips. The tailplane also has an equal, straight taper on both edges, but has rounded tips, while the fin and rudder are very tall, and taper more on the trailing edge, the apex being rounded.

The oval-sectioned fuselage is a well-streamlined shape, tapering gracefully to a pointed stern, and has a raised cockpit-cover, the hood of which hinges open. The two pilots enter and leave the glider by this means, but the rest of the occupants use a door in the side of the fuselage behind the wing. Twin wheels are fitted to each undercarriage leg mounted beneath the wings, legs and wheels being dropped after take-off if desired, and the landing made on long central skids. During initial training, however, it is usual to retain the wheels in order to save time between flights.

Maximum permitted speed on tow is 120 m.p.h. (Lysanders, Hectors, Masters and latterly Martinets, being used as tugs), and the normal free gliding speed is 80 m.p.h. Split flaps slow down the landing and steepen the glide path, but, even so, the landing speed is by no means slow. Wing loading is 14.7 lb./sq. ft., and loaded weight 3,598 lb.

The first Hotspur, produced in 1940, had a span of 61ft. 10in. and pointed wing-tips, but these gave trouble on the ground and were modified.



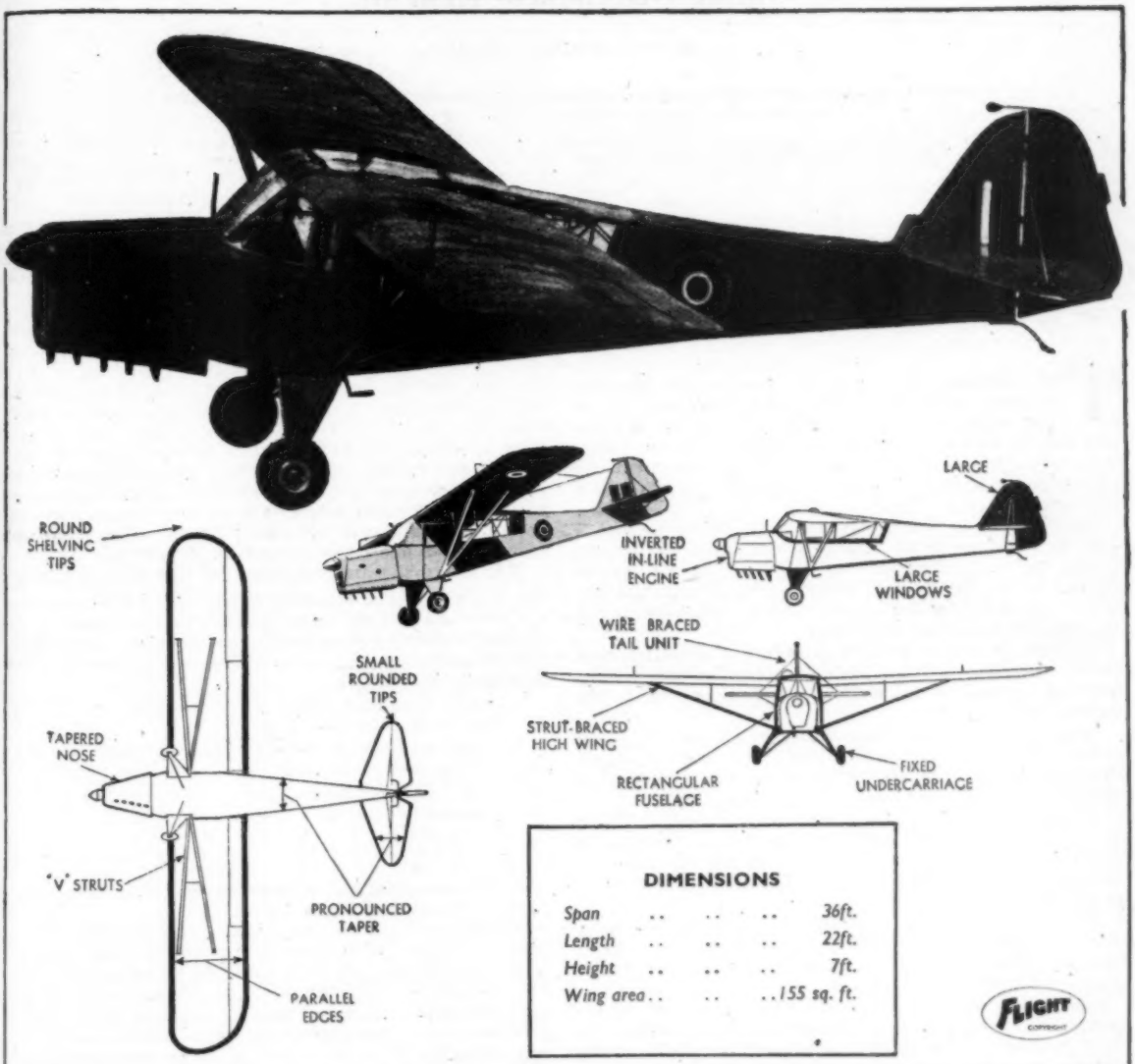
DIMENSIONS

Span	*45ft. 11in.*
Length	*39ft. 9in.*
Height	*10ft. 10in.*
Wing area	*272 sq. ft.*

FLIGHT COPYRIGHT

...heir Characteristics

TAYLORCRAFT AUSTER III



DIMENSIONS

Span	*36ft.*
Length	*22ft.*
Height	*7ft.*
Wing area	*..155 sq. ft.*

THANKS to an apparently pointless secrecy on the part of the authorities, it might have been supposed that the R.A.F. depended solely upon America for its light communication and liaison types; complete publicity was allowed to such aircraft as the Fairchild Argus and Vultee-Stinson Vigilant, but it has unaccountably been forbidden until quite recently to say a word about the admirable work being done by the British Taylorcraft.

Known in the R.A.F. as the Auster, Taylorcraft machines have been in active service since the early days of the war, the Auster I, with Cirrus engine, having done grand work in France spotting for the guns and on communications.

The latest version to be "released for publication" is the Auster III, which differs from the Auster I mainly in having a 130 h.p. Gipsy Major engine and split trailing-edge flaps. Another small, but important, modification is the extension of the transparent covering behind the upper part of the cabin to make good visibility still better. Even the substitution of a heavier and more powerful engine, however, called for no structural changes in the airframe, which is notable for its robust simplicity.

With the exception of the spruce main spars of the parallel-edged, high wings, and the fabric covering, welded steel tubing is used throughout the main structures; steel-drawn sections are used for the wing ribs. The lower extremities of the "V" wing struts, and the back legs of the fixed undercarriage meet at a special "shock truss," which forms the backbone of the fuselage and takes all main loads in direct fashion.

Side-by-side seating with dual control is provided, the space behind the seats being mainly occupied by the radio equipment. Top speed of the Auster III is 126 m.p.h., cruising speed 100 m.p.h., and landing speed 25 m.p.h. Its maximum loaded weight is 1,550 lb.

The Auster III can be distinguished from the several other light high-wing cabin types by its almost diamond-shaped tailplane and large, rounded fin and rudder.

Power, Speed and Weight

Gross Weight Accurately Determined from the Power/Speed Ratio

By W. NICHOLS, A.R.Ae.S.

TABLE I.—CHARACTERISTICS AND CALCULATED EXAMPLES OF REPRESENTATIVE BRITISH LIGHT AIRCRAFT.

Aircraft	Horse power	$\sqrt{\text{H.P.}_{max.}}$	Max. Speed m.p.h.	$\sqrt{V_{max.}}$	Disposable Load lb.	λ	β	Gross Weight Calculated lb.	Gross Weight Actual lb.	Error lb.	Error Per cent. Gross Wt.
Moth Minor	90	9·49	118	10·86	580	0·15	1·02	1548	1550	2	−0·13
Mosscraft	90	9·49	130	11·4	520	0·1	0·93	1402	1400	2	+0·14
Tiger Moth	130	11·4	109	10·44	655	0·05	0·96	1749	1770	21	−1·2
Magister	130	11·4	145	12·04	613	0·15	1·09	1855	1863	8	−0·43
Wicko...	130	11·4	140	11·85	745	0·14	1·10	1999	2000	1	−0·05
Cygnet	140	11·85	135	11·62	645	0·2*	1·22	2090	2100	10	−0·5
Owlet	140	11·85	127	11·27	703	0·25*	1·3	2243	2300	57	−2·5
Percival Gull VI ...	200	14·15	178	13·35	970	0·0	1·07	2484	2450	34	+1·4
Parnall 382	200	14·15	155	12·47	795	0·05	1·18	2464	2450	14	+0·57

*Stressed-skin Metal Construction.

THE methods by which the gross weight may be determined at the beginning of a new design are on the whole empirical, and every piece of information that may be obtained from the specification for the design in question is carefully examined, for if the design is to be successful the original estimate should be accurate to a high degree.

The designer in these days has a wealth of tabulated data at his disposal for almost every phase of aircraft design, but so far there does not appear to be any reliable method for the determination of the gross weight, and due to the complexity of the problem and the inconsistency of average data this is not surprising.

Methods in use at present include past experience of similar designs, average data tabulated from similar existing aircraft or calculations based upon the power loading to be expected.

Another method is to calculate the detailed weights for the power unit and the total removable load, and to assume that this weight will constitute a certain percentage of the gross weight, again based upon average data.

In these days of scientific progress such methods are, to say the least, haphazard and involve a considerable amount of time; and more often than not the estimate arrived at will require frequent readjustment as the design proceeds.

In the issues of *Flight* of July 30th and August 20th, 1942, methods were presented for estimating the gross weight of the fighter and the bomber respectively, which gave very accurate results.

Since then the writer has had the opportunity to investigate the problem from a different angle. From this investigation some logical conclusions have been established. To simplify this discussion only the case for light aircraft and trainer aircraft will be considered here for the present. With aircraft in this category the investigations were originally begun, though it should be emphasised that the method to be described applies to all orthodox aircraft, but with the more powerful and heavier class modifications to the simple formula must be introduced.

As a beginning, characteristics for a number of light aircraft and trainers of both British and American design were tabulated, some of which are given in Tables 1 and 2. From these data all attempts to estimate accurately the gross weight from average figures proved inconsistent and in many cases hopelessly inaccurate.

This led to the discovery that for this class of aircraft the empty weight agreed fairly closely with $\sqrt{\text{H.P.}_{max}} \times 100$, but the variation in many cases was too great for an accurate estimate to be generally made, and some modification to allow for the variation became necessary. The formula then became:

$$\text{Empty Weight} = \sqrt{\text{H.P.}_{max}} \times 100 \times \beta \quad .. \quad (1)$$

where β is a variable factor.

The next step was to solve for β, from which the conclusion was arrived at, that this value was related to $\sqrt{V_{max}}$ in miles per hour. This proved that the formula can be correctly written:

$$\beta = \left(\frac{\sqrt{\text{H.P.}_{max}}}{\sqrt{V_{max}}} + \lambda \right) \quad .. \quad .. \quad .. \quad .. \quad (2)$$

It will be noticed that a further value, λ, has been introduced. The reason is the following:

Algebraical formulae cannot be evolved to cater for the skill or otherwsie of the structural designers; also the purpose of the aircraft will have some bearing upon this value. For example, a trainer aircraft will need to be rather more robustly constructed than an ordinary light aircraft used for normal flying purposes; also in this country the fully aerobatic C. of A. will need to be considered when specified. Consequently the value of λ makes all the difference between an accurate estimate within 1 per cent. of the gross weight, and one of, say, 5 per cent. to 7 per cent. Suitable values of λ have been tabulated in Table 3 which apply to aircraft in this category only up to say,

TABLE 2.—CHARACTERISTICS AND CALCULATED EXAMPLES OF REPRESENTATIVE AMERICAN LIGHT AIRCRAFT.

Aircraft	Horse power	$\sqrt{\text{H.P.}_{max.}}$	Max. Speed m.p.h.	$\sqrt{V_{max.}}$	Disposable Load lb.	λ	β	Gross Weight Calculated lb.	Gross Weight Actual lb.	Error lb.	Error Per cent. Gross Wt.
Aeronca	65	8·06	105	10·25	480	0·05	0·83	1149	1155	6	−0·5
Luscombe	65	8·06	115	10·73	550	0·05*	0·8	1195	1200	5	−0·42
Taylorcraft	65	8·06	105	10·25	518	0·02	0·8	1163	1150	13	+1·14
Piper Cub Coupe ...	75	8·66	100	10·0	535	0·15	1·01	1409	1400	9	+0·65
Culver	80	8·94	140	11·83	585	0·05	0·8	1300	1305	5	−0·4
Monocoupe	90	9·49	130	11·4	637	0·17	1·0	1586	1610	24	−1·5
Porterfield	90	9·49	135	11·62	503	0·05	0·86	1319	1326	7	−0·54
Rearwin Speedster ...	125	11·18	150	12·25	630	0·05	0·96	1703	1700	3	+0·18
American	125	11·18	120	10·95	625	0·0	1·02	1765	1775	10	−0·6
Ryan S.C.	145	12·04	150	12·25	800	0·15*	1·13	2160	2150	10	+0·5

* Stressed-skin Metal Construction.

POWER, SPEED AND WEIGHT

about 250 h.p. At this point values for λ begin to rise progressively with the square root of the horse power.

As an example of the practical application of the formula, assume a specification for a light trainer with characteristics similar to the Miles Magister. From such a specification the power unit would be the Gypsy Major of 130 h.p. As the first estimate from (1) will constitute the "weight empty," it will be necessary to obtain from the specification the weight of the disposable load which will include such items as crew, fuel and oil, baggage and any removable equipment such as parachutes, etc., and in this particular example will total 613 lb. The maximum speed specified would be 145 miles per hour and for the trainer $\lambda = 0.15$.

From (2) therefore $\beta = \frac{11.4}{12.04} + 0.15 = 1.09$

and from (1)

Empty Weight $= 11.4 \times 100 \times 1.09 = 1,242$ lb.

from which gross weight = empty weight + disposable load, being $1,242 + 613 = 1,855$ lb.

The gross weight of the Miles Magister is given as 1,863 lb. involving an error of 8 lb. or less than — 0.5 per cent.

For an example of an aircraft in which the maximum performance is required, and every care is taken to reduce the structural weight, consistent with strength requirements, assume a specification based upon the Percival Gull Six. Here the power unit is the 200 h.p. Gypsy VI; disposable load = 970 lb. and maximum speed is to be 178 m.p.h. In this case $\lambda = 0$.

From (2) $\beta = \frac{14.15}{13.2} = 1.07$

and from (1)

empty weight $= 14.15 \times 100 \times 1.07 = 1,514$ lb.

gross weight $= 1,514 + 970 = 2,484$ lb.

The gross weight of the Gull Six is given as 2,450 lb., the error in this case being 39 lb., or approximately 1.5 per cent.

TABLE 3.—VALUES OF λ FOR LIGHT AIRCRAFT AND TRAINERS UP TO APPROX. 250 H.P.

Good Economical Structural Design and High Performance		Light Trainer Aircraft		Metal, Stressed-skin and Moulded Plywood Construction	
Good	Average	Good	Average	Good	Average
Nil	0.5	0.1	0.15	0.15	0.25

Characteristics and the results of calculated examples are given in Tables 1 and 2 for aircraft in this category, and the degree of accuracy attained is rather remarkable.

Very few data are available for light aircraft of metal, stressed-skin or moulded plywood construction, but it will be noticed from Table 3 that the value of λ in this case appears to be slightly higher, due possibly to the fact that such construction for light aircraft is a little heavier than normal wood construction or welded steel tube, a position which rapidly becomes reversed as the size of the aircraft increases.

A specification for such an aircraft could embody characteristics similar to the *Cygnet* produced by General Aircraft, Ltd. Utilising this aircraft as a basic example, therefore, the power unit would be the 140 h.p. Cirrus Major; disposable load 645 lb., maximum speed 135 m.p.h. and $\lambda = 0.2$.

From (2) $\beta = \frac{11.85}{11.65} + 0.2 = 1.22$

From (1) Weight empty $= 11.85 \times 100 \times 1.22 = 1,445$ lb.

Gross weight $= 1,445 + 645 = 2,090$ lb.

Gross weight for the Cygnet is 2,100 lb. Therefore the error is again but 10 lb., or — 0.5 per cent.

For aircraft of the largest dimensions and load-carrying capacity the formula, with but slight modification, holds good, and offers the same degree of accuracy. Calculations from specified data for the Douglas D.C.3 and Curtiss-Wright transport, the latter of 38,000 lb. gross weight, work out to within 1.0 per cent.

AUSTRALIAN PIONEER PASSES

WITH the passing of William Ewart Hart, who died recently in Sydney at the age of 57, Australia has lost one of her best-known pioneer airmen who, in December, 1911, received the first pilot's certificate to be granted in the Commonwealth.

Tribute is paid to Bill Hart in the August 31st issue of *Wings*, the official magazine of the R.A.A.F., in which is given the story of his early career.

Beginning as a dentist, Hart later turned to selling motor cars, but when he heard that a Bristol "box kite" had been left behind by an Englishman who had brought it out to Australia to try to interest the Commonwealth Government in aviation, he promptly bought it for £1,300.

Having taught himself to fly, and made a few practice flights, Hart decided to try a cross-country and, with his brother as passenger, flew from Penrith to Parramatta. It was an adventurous affair, but he arrived safely. His brother, however, flatly refused to risk the return journey, so Hart flew alone. It was the first cross-country flight ever made in Australia, and the performance was acclaimed by the Press of the whole world, even though it ended in a crash-landing which completely "wrote-off" the poor old Bristol. Hart, who was by no means "written-off," thereupon set about building another aircraft on similar lines to the box kite. This one was very light and none too stable. Nevertheless, Hart made a number of successful flights, including a landing and take-off at the Sydney showground where space was so limited that he only just managed to clear the surrounding buildings.

Soon after this, Hart was severely injured in a bad crash and was forced to give up flying for a time, but when war broke out in 1914 it was largely due to his urgings that the Australian Government formed several squadrons for active service, and Hart himself went to Egypt with No. 1 Squadron Australian Flying Corps. But his health gave trouble and he was sent to England as an instructor.

After the war he returned to dentistry, but he never lost his interest in flying and, at the time of his death, was senior vice-president of the Air Force Association.

MALTA'S VETERAN "GLADIATOR"

"FAITH," sole survivor of the three Gladiator fighters, "Faith," "Hope" and "Charity," with which the Royal Air Force in Malta first faced the onslaught of the Italian bombers, has been presented to the people of Malta by the A.O.C., Air Vice-Marshal Sir Keith R. Park.

When Italy declared war and Mussolini began to bomb Malta —which he said he would "capture in three weeks"—the only fighters on the island were four Gladiators, in crates, belonging to the Fleet Air Arm. Assembled and armed, three of them patrolled the skies while the fourth acted as a reserve for spare parts.

They were instantly named "Faith," "Hope" and "Charity" by the Maltese, and in the first 18 days after the Italian declaration of war, they intercepted 144 Italian bombers and fighters. Without loss to themselves, they destroyed or badly damaged five enemy aircraft and turned away many formations of bombers.

To the Maltese, these three Gladiators—flown by volunteer pilots from stations and air headquarters—meant everything.

"FLIGHT" PHOTOGRAPHS

THE announcement of increase in price of *Flight* postcard-size photographs of Allied and enemy aircraft has brought several enquiries for larger-size pictures.

A photographic print of any photograph published in this journal which bears the words "*Flight Photograph*" can be supplied as follows:—

6 × 4in.: 1s. 6d. each, toned sepia 2s. 6d. each.
8 × 6in.: 2s. 6d. each, toned sepia 4s. 0d. each.
10 × 8in.: 3s. 6d. each, toned sepia 5s. 6d. each.

Larger sizes, at proportionate cost, can be supplied if required.

While it is not possible to issue a list of all the *Flight* photographs available, almost every type of British aircraft is represented in our negative files, and American types in service with the R.A.F.

A list of types stocked in the postcard-size series, and a specimen photograph, will be sent on receipt of 8d.

Topics of the Day

Observations, Abstract and Concrete

The Work of the Royal Observer Corps Must Not be Forgotten : A Possible Peacetime Use for the Organisation : Does Super-efficiency Mean Decay? : New Standards of Value

ALTHOUGH the Royal Observer Corps was obviously and originally formed for the express purpose of plotting the movements of enemy aircraft over this country, their work in plotting the movements of casual friendly aircraft has really been of a quite outstandingly useful nature. I say that because, in the present absence of any enemy aircraft over this lucky little country, the R.O.C. is liable to be forgotten.

And it mustn't be forgotten. Its members won't get any medals—as thousands of other brave and hard-working people will inevitably be neglected, for the very good reason that it would be merely silly if *everyone* got a medal—but they are doing a much more terrific job of work than the average person realises. Except for those who like sitting for hours in the open (very open) air, and who have a special passion for aircraft recognition, it is boring work. When and if the Axis aircraft appear again in quantity over this country, they will come into the limelight again, and their considerable practice in dealing with mere Ansons, Whitleys and Hurricanes will stand them in very good stead. In the meantime they are telling the various Commands exactly where their aircraft are with a most phenomenal accuracy.

Let any pilot set off in some strange aircraft and see what happens. His movements may be the most devious, and he may fly at anything from tree-top height to the sub-stratosphere, but the Observer boys will have him plotted more often than not. Of course, if you make a quick dart into some airfield, whence another aircraft of the same type takes off immediately and sets off on more or less the same course, they are liable to be a little fogged, but within reason they have reached a stage of near-perfection. You talk to any pilot who has the sort of job which sends him all over the place at different heights, he will tell you that the local fighter control has had him—via the R.O.C.—completely buttoned up all the time.

When Peace Comes

No one can expect these enthusiastic chaps to continue in their job after this war is over, but some of them might care to if the rewards, either in a professional or amateur capacity, are sufficiently worthwhile. And, if there is any supply of petrol and all the other things that make private flying possible, their work can be equally useful in peacetime. Admittedly, it's not much of a help to you, when you are lost, to know that Observer Smith of Heckmondwyke knows exactly where you are, and has known for some considerable time while you have been tooling around in a blind panic looking for the Heckmondwyke Central Airport. But even if no radio is available, such things covered by the general term "pyrotechnics" exist, and nowadays it is possible to put up a sort of Brock's Benefit which could be missed only by the most myopic pilot. Such Benefits cost money, but I've no doubt that the relieved and sweating pilot, if accosted in the bar of the local aero club, would pay up handsomely for any assistance which has been given.

The time will possibly come when old "Indicator," overconfident after the years he has spent in lethal military aircraft, will find himself in a jam while driving some inferior navigable balloon, and will be saved from sudden death, either on a mountain-side or in the hard objects which make up urban paraphernalia, by the flashing of innumerable lights of an obvious red colour. He will turn his navigable balloon in its tracks and stooge back on a reciprocal to find that the people at the local airport have been informed of his impending demise, and are firing rockets as hard as they can go. As a mere journalist, of course, "Indicator" will be unable to pay either in (rubber) cheque, or in cash, but he will thank them kindly and promise to say a nice word or two for them when next he bursts into print.

And who will pay the small salaries of the Observers? Why, the State, of course, which will have abstracted the necessary sum both from the observers and the pilots. Thus all will be happy, digging holes and filling them up again in the approved style of the perfect economy. Not that I'm anything but superficially cynical about the peculiar ways of the Powers That Be in peacetime. Nearly all of us would rather live in a slightly muddled world where everything isn't quite super-efficient. After all, left to itself and with rather a different kind of race running the thing, the Axis world might eventually become a supremely boring place where everything is done perfectly by numbers, and where the human being becomes merely an ant in an hygienic anthill, and, like the life cell in one's own body, important only as a part of the whole. Nobody, except perhaps the few people at the top, want that kind of world; it would, in any case, lead to the extinction of the race as such.

What Might Have Been

My quite personal opinion is that, had the Axis won the war when they might have done, the world would have been back just as it always has been within a century or less. The Germans are essentially a rather easy-living people, and they would have grown soft and fat while the various lesser breeds would, by the very nature of their environment, have become harder and harder. Suppressed peoples are always tough and virile. That is why the British somewhat free-and-easy method of dealing with "conquered" people is so very much more successful than anybody else's has been in the past; without quite knowing what we are doing, we have given them all the rope they have wanted so that they, too, have remained as soft as they were when originally overrun, militarily or commercially. The Romans came a little nearer to that ideal than any other crowd, and if they'd had modern communications and modern ideas of fitness, there might still be a *Pax Romanus*. Their descendants have lost any feeling they may have had of natural superiority, and have had to prove their own greatness by whip, castor oil and gun.

To take an extreme view, efficiency will eventually defeat its own ends. Forgetting such things as State-run projects (which are invariably run by too many people who are in a soft job and have no reason to work any harder than is necessary to keep that job), the perfectly organised world State might eventually be populated by beings who are so well looked after by medical services that they have lost the power to defeat their own diseases. All would be well until some inevitable natural catastrophe overtook a section of the world; the medical and hygienic services would then go haywire and the whole population would die of common colds or some other minor ailments. The only survivors would be the down-trodden—who had been largely denied the advantages of modern science and whose systems were still capable of defeating the invading germs without the help of serums and what-not.

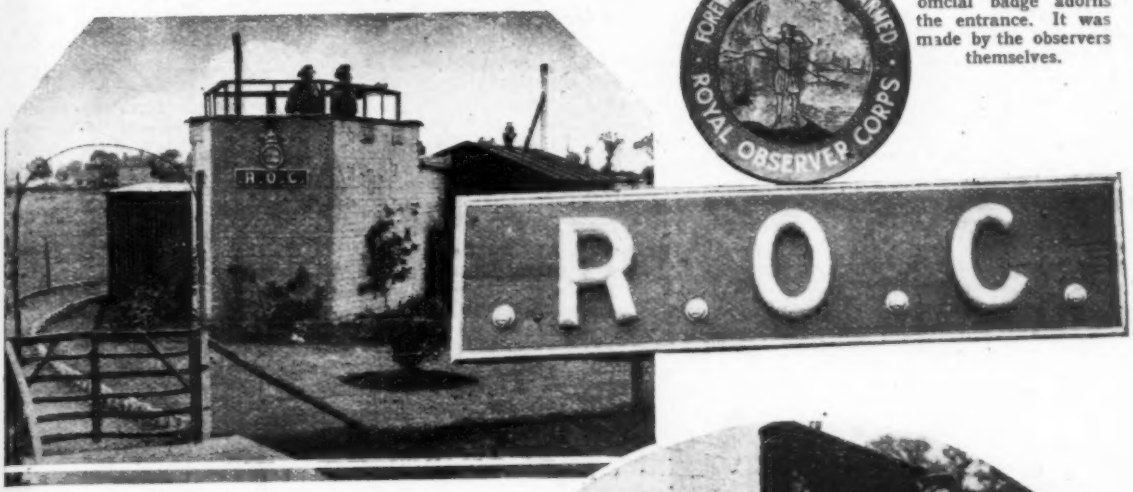
Although it is difficult to see how airlines of the future can be run on a sufficiently gargantuan scale to be worth while unless they are State-run and State-controlled, I can't help feeling that such organisations, unless run on

(*Continued on p.* 398)

Plotting Friend and Foe

Scenes at a Typical Royal Observer Corps Post :

This large replica of the official badge adorns the entrance. It was made by the observers themselves.



Entrance to the post, with observers on the alert.

ON the opposite page "Indicator" has a few kind words to say about the Royal Observer Corps. These pictures, from an R.O.C. Post "somewhere in East Anglia," happened to be taken on the day when there was an inspection by the Group Officer, who appeared to take a friendly interest in the post's gardening efforts as well as being officially concerned to see that everything was shipshape and efficiency up to the very high standard demanded.

This particular post is, perhaps, a little more "luxurious" than the majority, but men work all the better for being comfortable, and the watch on the sky goes on throughout the twenty-four hours.

Many a bleak spot has been rendered cheerful by the tender care devoted by observers to their small flower gardens.

A friendly aircraft gives the observers an opportunity to do a little plotting. "They have reached a stage of near-perfection," says "Indicator" on the opposite page.

(Right) Rifle inspection by the group officer. Note the frieze of plan views under the windows.

OBSERVATIONS, ABSTRACT AND CONCRETE

very disciplined lines and with a background of real tradition, may become less and less efficient. Without some form of competition, with profits (in cash or in kind) for the more effective organisers, the only alternative seems to be a series of lines run by a kind of Air Force in which tradition and friendly international competition will drive them to greater and greater efforts.

I don't believe that cash profit is by any manner of means the most effective drive to produce the efficiency and bravery and ingenuity which will be necessary; war after war has shown that the hardest and most difficult work is done by people for the sake of doing it, or, at the worst, in the hope of gathering a gong or two—with the consequent prestige. New standards must be found and kept. The abstract value of property has declined beyond redemption during this war, and people have found that there are so many more important things than mere monetary gain, and that happiness is not obtained by the old-fashioned means.

Returning to economics, and by way of a postscript, I heard a funny grey-marketeering story the other day. It's quite true, and the individuals concerned were just like you and me, and were not smooth, oily types with queer noses. A certain chap had been in the habit of obtaining a few extra eggs for his young family from an amateur chicken-farmer who wasn't himself very fond of the things and had a few to spare from time to time. The purchaser was glad indeed to pay a few pennies more than the ordinary price, and he was in the habit of showing his gratitude by producing, from time to time, a bottle of whisky, which he sold to the chicken farmer. In due course this purchaser moved to another part of the country and the arrangement was taken over by one of his friends, who also had hungry young egg-loving mouths to feed. The barter-and-present system was explained. A few days later the second purchaser received an express letter from the first, telling him for heaven's sake to continue charging the chicken farmer the same price for the whisky and not to sell it for the lower price which was (he knew) being paid by both of them; he'd hate the friendly chicken-farmer "to think that he'd been rooking him."

"INDICATOR."

Air Askari Corps

There are now air regiments of the famous native African Askari Corps. They perform guard and patrol duties at R.A.F. airfields and depots in the same manner as the R.A.F. Regiment. All the officers and some of the n.c.o.s are Europeans, and they have a considerable knowledge of local conditions. The South Central African natives take to soldiering with great zest and soon become very smart. (Top left) Taking the oath with uplifted right hand. (Top right) Signing the attestation form by thumb printing on the dotted line. (Bottom left) The Command Officer's inspection. (Bottom right) On guard over a Tiger Moth.

MOSQUITO STING: A Bomber Command daylight attack on the railway workshops at Ehrang, just inside Germany over the Luxemburg border Picture shows bombs bursting on the forwarding sidings of the Ehrang marshalling yard.

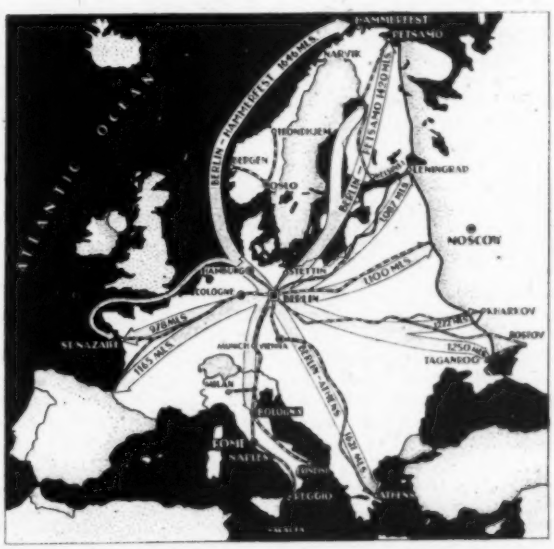
Combined Operations of Allied Air Forces and Guerillas : Dislocation of Railway Transport : "Train Busting" Profitable : Importance of Inland Waterways

By V. L. GRUBERG

THE air war waged by the Allies against Germany has made everyone familiar with a score of hitherto obscure names of Ruhr cities. Far less public attention, however, is focused on the reports of destruction of marshalling yards and communication centres, and on that gallant effort of the R.A.F. which carries the somewhat frivolous name of "train busting."

Yet these operations strike at the most sensitive and vital parts of Germany's war machine.

"To-day"—says a German commentator—"the division of the armed forces into land, sea and air arms must be extended to include transport. Transport is the fourth arm of the military machine." And Secretary of State Ganzenmüller, of the German Ministry of Transport, explains the significance of this arm in the Nazi war effort: "In a modern war," he says, "the transport problem is of decisive importance, especially when it is necessary to traverse spaces such as we have occupied from Biarritz to the Caucasus, from Denmark to the most southern cape of Europe." It is precisely because of this stretching of German communications, shown on the accompanying map, and the necessity to circulate war materials and men over that large area, that air operations which impede and harass transport go a long way towards shortening the war.



STRETCHED COMMUNICATIONS: The map shows the wartime expansion of Germany's railway system and distances of the main lines along which war supplies have to be circulated.

The main arteries of supplies in German-dominated Europe flow along the railway system, which to-day covers a network of over 98,000 miles. But this system, though extremely well organised, is seriously overstrained and labours under a shortage of rolling stock as well as under difficulties of replacements, repairs and manpower. "These difficulties," to quote the *Hamburger Fremdenblatt* (18.7.43), "are further aggravated by the wear and tear on equipment and by the direct interference of enemy activities and other factors."

Among the "*other factors*" which have taken a heavy toll of German rolling stock has been the complete failure of German railway

AIR WAR ON TRANSPORT

engines to stand up to the severe conditions of the Russian winter. Moreover, says an editorial in the *Frankfurter Zeitung* of June 25th, 1943, "in the thinly populated, recently conquered areas where installations have been largely destroyed, the German railwayman had to rely entirely upon himself." While the Germans were better prepared for the second winter, they had to face a new problem: "It is more difficult," complains a German writer, "to protect the railwayman from the cunning attacks of the partisans, who operate in the swampy and forest areas of the front, particularly in the central sector. The same applies to his work in the air danger zones of the West, in and outside the Reich's frontiers." (*Frankfurter Zeitung*, 25.6.43.)

During the Red Army winter offensive no fewer than 890 railway engines and 22,000 railway trucks had to be written off Germany's books. The Soviet Air Force continues to inflict heavy blows on the railway system behind the fighting zone; and deeper inland, in the Ukraine, in Poland, in the Balkans and in France, guerilla operations constantly blow up bridges, derail trains and destroy lines.

Bomber Offensive

Yet, "Wheels must roll for victory," proclaims a poster prominently displayed all over Germany. But again the R.A.F. throws a spanner into those wheels and upsets their motion. Coming on top of these losses, the R.A.F. offensive tears deep gaps in Germany's transport system. Vital railway junctions, repair centres, marshalling yards, etc., in Germany and in the occupied countries, are under constant fire from R.A.F. bombers. In Germany alone, Hamm was attacked 85 times; on 33 occasions R.A.F. bombers visited Soest, and on 26 occasions Dortmund; the important junction of Nüremberg has sustained eight severe attacks. Apart from 22 attacks on its rail traffic, Berlin, which is one of the focal points of German rail communications, has had each of its fourteen stations attended to by R.A.F. bombers.

Neutral reports from Berlin after the raid on August 23rd may help to illustrate how one heavy raid can affect railway traffic: the Swedish *Aftonbladet* quotes travellers arriving at Malmö after the raid as saying that the Zoo Station had been hit, the Charlottenburg station heavily damaged, the Rommelsburg and Oberschöneweide goods stations had received direct hits, and the elevated railway been put out of action.

Another example of traffic dislocation comes from Mannheim, where, after the raid on August 20th, the central station had to close down, two smaller stations were put out of use, and a receiving office for consignments of essential goods had to be improvised in the local town hall.

One could go on quoting such examples of traffic dislocation indefinitely. Moreover, if one remembers that already in 1937 45 per cent. of Germany's total railway freight came from the Rhineland-Westphalian district, one can visualise the effect of the 50,000 tons of bombs dropped on that district on railway deliveries to other industrial centres and to the Russian front.

A further implication of these bombing operations is the evacuation of millions of people from Western Germany, which must add considerably to the strain on the railway system. It is because of this mass exodus from bomber-infested areas that various measures taken to relieve the railways of non-essential civilian traffic remained fruitless; the official report of the German State Railways shows, in fact, an increase of passenger traffic amounting to one-third of the total traffic turnover.

The effect of strategic bombing, apart from destruction of German production and transport centres, produces what one is tempted to call hidden assets. It was estimated, for instance, that operations of the Bomber Command had been mainly responsible for a reduction of German coal transports to Italy by one-third, before Italy's collapse. The migration of the industry necessitated by

LOCO-BUSTING MUSTANG: A train just about to cross a viaduct is being attacked by R.C.A.F. Mustangs. The picture is a typical example of the deadly effect of well-aimed cannon fire on railway engines.

the destruction in the Ruhr, which calls for vast supplies of coal, further complicates the transport problem. Were this production to replace only half of the Ruhr output some 12,000,000 tons of coke would have to be sent to Silesia; this would involve the tying-up of some 700 locomotives and 27,000 trucks. Even discounting the difficulties created by bombing dislocations, such traffic, either on the railways or on the waterways, would be an almost impossible burden to a transport system already strained to capacity.

Apart from the heavy bombing of important communication centres, during the past six months the R.A.F. fighters, fighter-bombers and light-bombers carried out their attacks on transport targets on ninety days and sixty-seven nights. In fact, ever since the beginning of the war the nerve centre of the German railway system, which lies within a radius of about 450 miles from air bases in this country, has been subjected to constant attacks, and Spitfires, Mustangs and Typhoons all had their share in playing havoc with German rail traffic. In March last new intensity was added to these attacks by the use of Mosquitoes inside Germany, in addition to the shorter-range raids by Whirlwinds.

Train-busting—low-level daylight attacks on single trains and locomotives—has proved a most effective method of doing to the German railway system that which the Russian blizzards did in the East. The boiler, it will be remembered, is under a pressure of 200-300 lb./sq. in., and is extremely susceptible to the touch of a cannon shell, light bomb or machine-gun fire. Once caught, an engine cannot stand up to the attack of a Mustang, and is an easy prey to its four 20 mm. cannons. From a report of a R.C.A.F. Army Co-operation squadron, which in less than 30 minutes knocked out 12 railway engines, it is obvious how fast and deadly are the blows of the loco-busters.

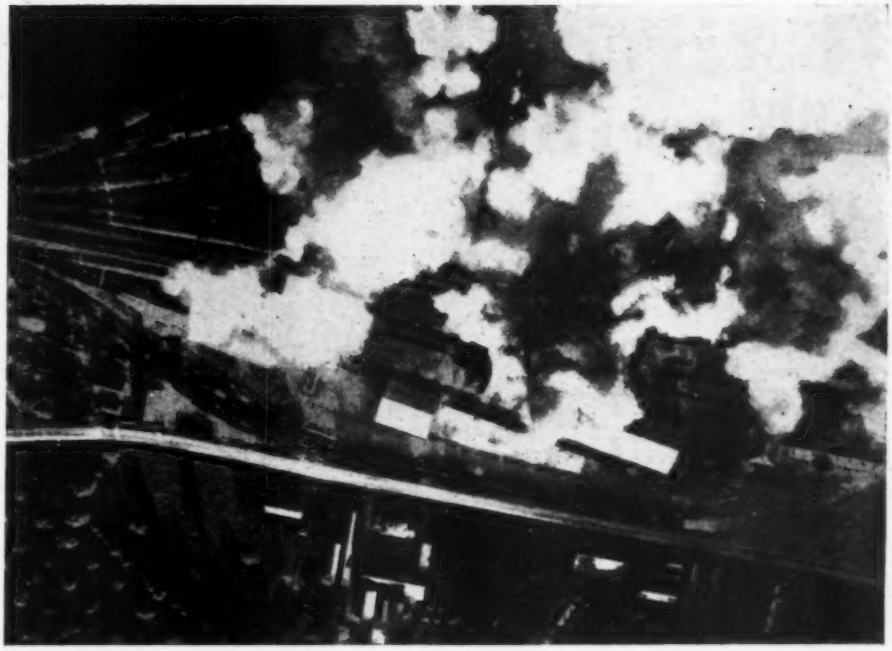
Results of Loco-busting

Whether the engine is derailed, damaged or completely written-off is perhaps of less importance, for any serious damage impedes the schedule operation of trains, increases the strain on repair workshops, and consumes vital material and man-power.

During the past six months at least 600 railway engines have been put out of action by attacks of Fighter Command and Army Co-operation Command over Western Europe and Germany.

Since, according to Prof. F. Neesen, of the Danzig Technical College, about 24,000 working hours are required to complete a locomotive, the total figure for labour-hours lost through these attacks would amount to about seven months' labour by 10,000 men! To apply yet another comparison, this figure approximates the total number of locomotives previously tied up in a whole year by German

AIR WAR ON TRANSPORT



DAY ATTACK: Buildings and sidings of the Serqueux junction, between the Paris-Dieppe and Amiens-Rouen lines, under a hail of bombs from R.A.F. Bostons.

coal transports to Italy.

To replace losses of railway stock sustained on all fronts, locomotive and wagon production is being feverishly pushed forward in France, Germany, Austria and Poland. "Austerity" locomotives at present in production are said to have introduced considerable economies in materials in short supply, such as copper, and cut down production time by 25 per cent. But the growing crescendo of the bomber offensive against production centres, and the train-busting operations, set a pace which is not easy for the Germans to keep up with. Thus gradually a picture emerges of a pattern of combined operations of the R.A.F., of the Soviet Air Force, and of the guerillas all aimed at the destruction of Germany's means of transport.

But if these operations undermine directly Germany's war efficacy, the inland waterways, which during the past two years have gained increasingly in importance, merit an equally prominent place in Allied air strategy.

The backbone of the water transport system is, of course, the Rhine which, supported by the vast industrial regions it traverses in Germany, France and Holland, carries enormous quantities of essential war traffic. Vast quantities of ore, for instance, come up the river to supplement the Ruhr production, and the Dortmund-Ems canal carried in 1937 a traffic of 20,000,000 tons.

Already in peacetime this inland water traffic was of first-class importance to Germany's industrial effort since 35-37 per cent. of its total volume was coal and 15 to 17 per cent. different ores.

In 1939 Germany owned nearly 6,000 inland vessels, steam and diesel powered, and about 14,000 unpowered barges with a total capacity of over 6,000,000 tons.

On October 23rd, 1942, Hitler ordered the strict co-ordination of the rail, water and road communications under a uniform control. Stringent measures since adopted are designed to relieve the burden of the railways by a switch-over of the heavy freight traffic to inland waterways.

As an example one may quote an order issued on November 14th, 1942, ruling that all freight from such important production centres as Oldenburg, Bremen, Bremerhaven, Fallersleben, Hammeln, Hanover, Magdeburg, Schönebeck, Tagermünde and Wesermünde, consigned to localities on the rivers Rhine, Weser, Elbe and Oder, or on the canals, must go on the inland waterways only.

Greater use is also being made of waterways for transports from Germany to Bohemia, and motor ships run on fixed time-tables on the routes Hamburg-Magdeburg-Prague, Berlin-Prague and Saxony-Sudeten. Not only industrial material is being circulated in this way, but passenger and foodstuff traffic. Special express boats, operated by the Bohemia Shipping Co., carry, for instance, vegetables for German tables in five or six hours from Melnik to Prague where they are transhipped and unloaded at St. Francis Embankment near the Ministry of Economics building, a well-deserving target for Allied Air Forces.

To be sure, the attention paid by Bomber Command has certainly had an impeding effect on the water traffic as well. At the end of May, for instance, traffic on barges on the Rhine from the Ruhr to Basle had been completely interrupted. Again, the extensive attacks on such inland ports as Duisburg delayed the downstream traffic to Holland by about five or six days. Similarly the heavy raids on Cologne, Hamburg and the 83 attacks carried out on Emden must have left their mark on this method of transport. But despite the punishment received the Germans are still in a position to rely on their waterways.

The very nature of the canal and river traffic, which is less rigidly tied to lines of movement and offers more possibilities for improvisation, calls perhaps for a development of a method of attack specially designed for this purpose if such attacks are to be really effective.

Turning to South-Eastern Europe, Allied control of bases in Italy will facilitate an intensification of air attacks on transport targets in that region. An important source of supply for Germany is the agricultural and mineral production of Rumania which at present is largely transported on the Danube.

The main transport targets along the Danube are to be sought among the thirty-eight ports handling different essential war freight. Of these ports, three should be pinpointed: Giurgiu, which caters for Germany's petroleum needs; Braila, which has a silo capacity of 25,000 tons and a storage space of 1,500 sq. ft.; and Galatz, with a 1,500 ft. long wheat quay, a storage space of 27,900 sq. ft., and a silo capacity of 25,000 tons which caters for the German stomach.

From the toe of Italy transport targets in Rumania lie within 770 miles and those within Yugoslavia at 600 miles. Whether for transport of such raw material as bauxite from Yugoslavia, up west, or movement of troops in the opposite direction, the Balkan railway system is one of Germany's soft spots. Only few, and not too efficient lines exist in this region, and most of the track is still narrow-gauge. These difficulties are further increased by the operations of patriot forces which for the past years have been harassing German transports. Intensification of Allied air operations in this theatre of war may indeed put Germany's communications in a most grave position.

Aircraft "Plumbing"

The R.A.F. Technical Training Command Halifax Instructional School

THE part played by manufacturers' courses, made possible only by the excellent co-operation of manufacturers and the R.A.F. Technical Training Command, will only be accurately assessed after the Hun is beaten and we can afford the time to look around and judge the true value of the many parts played on the grim stage of war.

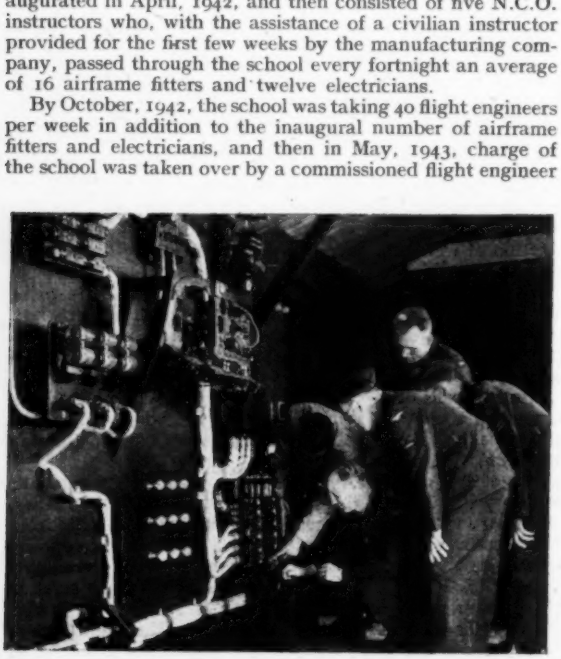
The imperative need for a phalanx of specialists to support the ever-growing numbers of aircraft produced, to control them, maintain them and to repair them, brought a grave problem before those entrusted with the successful functioning of the Service.

Manufacturers' courses were the outcome of the deliberations, and a magnificent job of work they have done. In 1939 there were but three courses in existence, whilst at the present time no fewer than 200 are contributing their quota in maintaining the R.A.F. as the most efficient Air Force in the world.

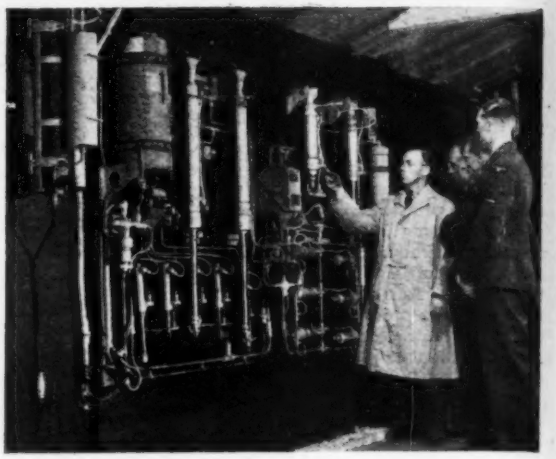
Flight has reviewed the work and progress of several of these schools in the past, and we have welcomed the opportunity of once more seeing for ourselves, and our readers, the first-class job being done at yet another, this one providing instruction on Handley Page Halifax aircraft.

The school, which, in common with the others, is an R.A.F. Technical Training Command establishment attached to a manufacturing company (Rootes), was inaugurated in April, 1942, and then consisted of five N.C.O. instructors who, with the assistance of a civilian instructor provided for the first few weeks by the manufacturing company, passed through the school every fortnight an average of 16 airframe fitters and twelve electricians.

By October, 1942, the school was taking 40 flight engineers per week in addition to the inaugural number of airframe fitters and electricians, and then in May, 1943, charge of the school was taken over by a commissioned flight engineer and enlarged to house mock-ups of working models and parts of the aircraft.



Bomb-release equipment laid out in an easily understood way. The rows of electric bulbs represent the equivalent of "bombs away."



A complete layout of the Dowty hydraulic system.

The school exists primarily to give specialised instruction on Halifax aircraft to flight engineers, aircrews, airframe fitters and electricians. Basic training is given at the R.A.F. primary school of technical training, and then, in addition to their basic training, aircrews receive one week's course at this school and maintenance crews two weeks. Maintenance crews are especially selected for the course by their own station, and the high level of keenness noticeable in all "pupils" must go a long way towards making the instructor's job less of a repetitive monotony than it might otherwise be.

The instructional equipment of the school is remarkably comprehensive and this, together with the excellent state of good will and co-operation which exists between the instructional staff and the manufacturing company, and the provision of free access to the factory itself, contributes in great measure to the success of the school. An interesting sidelight on the establishment is that much of the equipment used for instruction is reclaimed from crashed aircraft, and in point of fact about 3 per cent. only is new equipment, whilst in constructing the mock-ups no outside labour was employed; the instructors returned at night and on their off days and completed the whole of the work themselves. This surely is an excellent testimony to the cause of enthusiasm for one's labour.

Very Few Failures

The lecture rooms are large and well ventilated, and the blackboards are of sufficient size to allow the instructors to make really large-scale drawings—a considerable amount can be illustrated on an expanse of 36 square feet.

The company supply a profusion of drawings, the great majority coloured, and every step is taken to ensure that all trainees have got the "gen." Certainly the course comes under the general heading of intensive training, but the instruction given is the most comprehensive possible over the fields it covers. Written examinations are given each Friday and occupy three hours. The very few failures which occur is evidence of the high standard of instruction given and the genuine interest of the men in the course.

The flight engineer's course embraces a necessarily extensive range of items and is possibly the most widely interesting. First, the fuel tank layout and feed system is covered, together with the lubrication system. The Dowty hydraulic system is next dealt with and includes operation of undercarriage, bomb-doors, flaps, radiator shutters and landing light, together with the emergency air operation of bomb-doors and flaps. The complete electrical layout of the aircraft, possible faults and their remedies are next explained, followed by a visit to the

A "working model" of a Halifax undercarriage is so laid out that the hydraulic operating system can be followed in all its detail.

factory. The oxygen supply system is given an important place in the curriculum, with instruction on the positions of various components, supply lines, possible damage through enemy action, and diagnosis of evidence symptomatic of lack of oxygen. This is followed by a lecture on the aircraft controls, and in view of the vital importance of these items, the trainee is fully instructed in various possible mishaps that may occur and the action to be taken in overcoming them.

Throughout the instructional course remedying action on all components for breakdowns and failures due to enemy action is dealt with exhaustively, in addition to the normal maintenance operations and sequences.

Practical Work on Mock-ups

Following the Bloc-Tube controls installation, instruction is given on the pneumatic system, cabin heating and installation of the flotation emergency dinghy; the automatic control is next dealt with, succeeded by vacuum services and fire-extinguishing devices. The latest modification to Halifax aircraft occupies the last leg of the course, the final stages being devoted to revision and the written examination.

The airframe fitters' course covers different ground from the flight engineers'; two types of hydraulic installations are dealt with, the Messier-Lockheed and the Dowty, together with their respective maintenance, faults and remedies. Practical work is necessary in the instruction of airframe fitters, and the mock-ups provide the opportunity for the exercise of this aspect of training.

The pneumatic system is exhaustively covered and a good deal of time devoted to the construction of the airframe, and assembly and adjustment of flight controls. The layout of the aircraft is linked with the foregoing work and is followed by the installation of the oxygen system and ground charging. The trainee airframe fitter is also instructed on cabin heating and the intricacies of the heating apparatus, the fuel and lubrication systems, installation and maintenance details of sub-assemblies, and the making of various parts in the machine shop.

The mock-ups are excellently devised, and the demonstration panels provide very clear pictures of the various layouts; and although at first sight the maze of units and connections are extremely confusing, a few moments' study convinces the tyro of the basic simplicity of the installations. The advantage provided by using mock-ups and demonstration panels are amplified by the fact that after classes the men are allowed to examine the actual installations on the aircraft itself.

A complete display panel of the Dowty hydraulic system is a very useful adjunct, as is also a similar layout of the Messier-Lockheed system. In addition to these is a complete mock installation of Bloc-Tube controls, whilst for the intensive instruction on the oxygen supply system, the front portion of the oxygen economiser has been cut away and a transparent window fitted so that the action of the bellows may readily be observed. The main electrical panel and the various regulators are effectively displayed and, somewhat naturally, most attention is given to this aspect of the aircraft equipment by the electrician trainees. Operation of the display panel installations is provided by a 10 h.p. electric motor, which drives a Bristol gear box mounting a 24-volt 1,500-watt generator, three Lockheed MK VI pumps and a Heywood compressor.

Theory and Practice for Electricians

The course of instruction given to electricians is widely divergent from the other courses, but the same high standard is maintained both at the "imparting" and the "receiving" ends. Theory and practice are both dealt with surprisingly exhaustively in view of the length of the course, and starting with the Breeze wiring system the trainee is then tutored on layouts, wiring references, junction boxes and power supplies, followed by parallel connections, regulators, cut-outs and charge fail lights. Lectures continue on voltage, regulator panel wiring and generator circuits, the final part of the course being devoted to the extremely important wiring of gun turrets and bombing gear.

An equal amount of attention is paid in this course to the possible causes of faults and their remedies as is devoted to similar aspects in the other courses, and there can be no doubt that the ability to keep the maximum number of aircraft in active operation, and that tenacity of purpose allied to sound knowledge of their subject which brings so many of our aircraft safely back to their bases, is due in no small part to the sound basis of training on which the Royal Air Force is built, of which manufacturers' courses play an inimitable part.

"THE REAL THING": After classroom instruction the trainees are given facilities for examining the actual equipment as fitted on the latest type of Halifax under construction in the factory.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

TECHNICAL TRAINING

Navy Courses for Air Engineers

IN your issue of September 2nd you published a letter about boys wishing to train as Engineers. This suggested that the Navy had no interest in training boys as Air Engineers.

Since the beginning of this year the Navy has been running courses for Air Engineers at Cambridge and Edinburgh.

The headmaster of any secondary school should know of these courses, and any boy with the right qualifications would have no difficulty in being selected.

For a boy of 17-18, keen on Air Engineering, I doubt if there is a better opportunity.

P. MILLER (Instructor Lieutenant, R.N.).

AIRSCREWS

Why Only Three Blades on a Typhoon?

AFTER reading S. J. Fairhurst's article on airscrews in *Flight* of September 16th, I am tempted to ask why the Typhoon with its 2,000+h.p. engine has only a three-bladed airscrew and the Spitfire IX only a four-blader?

According to the article, fighters with 1,600-2,000 h.p. engines with rated altitude 28,000ft. and over are under-bladed with four-bladed airscrews, and contra-rotating airscrews are really necessary.

If this is the case, surely the Typhoon's airscrew is very inefficient at speeds of 400 m.p.h. and over. The same applies to the Spitfire IX to a lesser degree.

There must be a reason for the preference of a three-bladed airscrew on the Typhoon. I wonder if any of your readers can enlighten me?

G. P. JONES.

THEORY OF FLIGHT

Weight, Speed and Wind Direction

IF it is indeed the case, as "Pilot, R.A.F.," suggests, that thousands of his confrères are handed aircraft without being given any hints on how to get home on zero H.P., then it would seem that somebody has forgotten something. When you buy a car they give you a booklet telling you how to get the best out of it and avoid the worst; apparently this admirable practice does not obtain in the R.A.F. I really cannot see why not. Obviously, the fault does not lie in "Pilot, R.A.F.," and his friends, who are merely taking a sensible interest in an important matter, but there is a *prima facie* case against those who, one must assume, have failed to make the information sufficiently easily accessible.

It is, of course, substantially correct that weight does not affect the gliding angle, relative to the air, but it does affect the speed, which is important in a head or tail wind. In general, hang on to all the weight in a head wind, and, if the wind is strong, fly a little faster than you would for best gliding angle. In a following wind throw everything overboard and tend to fly more slowly.

As to the flaps, it all depends on the type of aircraft and the type of flap; generally a few degrees of deflection is advantageous, particularly in a following wind.

W. E. HICK.

TOPICS OF THE DAY

Too Much of a Good Thing?

I WAS more than pleased to read the article entitled "Let Us Be Honest," appearing in the September 16th issue of your excellent publication. This articles does, I believe, fill a long-standing need, and will, I hope, serve to make some people think twice in the future.

For the past nine years I have been engaged in one phase of the aviation business, and from my knowledge of the industry I have the greatest faith in the future of air transport and private aviation. Furthermore, I consider myself a reasonably good traveller and not prone to experience more than the usual number of fears which beset us mortals.

However, after having travelled on 28 airlines, and in numerous private aircraft, in good weather and in bad, I must honestly say that either I am being dragged out of bed at some unearthly hour in the morning to go to the airport, or else I am already *en route*, in which case I am either bored, scared or sick. I have experienced forced-landings in Bulgaria and in Paraguay; I have dodged cliffs for hours in snow-squalls about the Sardinian coast; the airliner in which I was travelling from the Continent to Croydon when an hour overdue descended rapidly through the overcast to what the pilot believed to be the red light at Croydon, but which in reality was one on top of Tower Bridge; I have been bounced through Andean passes, over the plains of Texas and through the Carpathians; and I have experienced engine failures in Tunis and at Cabo Juby. After all of this I find that I very much enjoy the pleasures of an ocean voyage by steamer in peacetime, the interesting acquaintances one makes on the Simplon Express, the luxury of the Twentieth Century Limited, and the independence of the motor car. If I could commit a crime which would result in my being grounded for life, I should most assuredly do so.

I think flying is a wonderful achievement, and I hope it gives great pleasure to vast multitudes. Personally, I go by land or sea when I can.

"AIR-WEARY."

CIVIL AVIATION

Fear from the Air Must Cease

THE recent extensive correspondence on the future of air transport in your columns seems to display everyone's point of view except that of the rather elusive dumb animal, the "Man in the Street." We have had the big business point of view and the technician's point of view, but a few elementary facts have yet to be voiced.

The British public, in common with the public of other lands, have seen their cities laid waste and their homes destroyed, with appalling casualties, the total number of which will never be known. Many thousands of children all over the world associate the sound of an aircraft with horror automatically, and I think I voice a majority opinion when I say it must stop for ever. Fear from the air must cease

What nation can plan its life, what architects will design the beautiful cities of the future, what incentive is there to plan homes and schools if they are to be at the mercy of any gangster politician with an air force at his call, no matter what his nationality?

There is much talk of American domination in the air, of British backwardness, of selfish national interests.

For many years the control of air transportation has been a prize to be struggled for by railway companies, shipping interests and the like all over the world. In the main, their record of public service has not been very savoury, especially in the last few years prior to the war. The Cadnam report, though mild and considerably toned down, was not pleasant, and this was typical of a code which permeated the whole of transportation in the democratic countries.

Civil aviation will be the most vital public interest in the world from now on. Its internal organisation can easily be used, together with its bases, for military purposes. Its possibilities for abuse are infinite.

If our new airlines, which can be of incalculable good to a world public, are to remain in the hands of sectional interests devoted to the interests of a coterie of shareholders, many men will feel that this war has been fought in vain.

Aviation, civil or military, is an expression of man's power at its best and at its worst. The peoples of Britain, Poland, Russia and China know too well what that power is. Germany and Japan will know, too, increasingly and relentlessly.

The Press is already voicing opinions as to what should be done when the war is over, and the general indications show a distressing lack of vision and originality. Already one hears the dreary clichés of 1919 being repeated, and on plenty of post-war problems besides air transportation.

There is no place for the mediocre mind with an eye to the main chance when this war is over. Any attempt to obtain air monopolies in world areas must fail. The air is free to all. There must be a world policy, intelligently planned, otherwise these dreary old men, full of fear and greed (and who will soon die anyway), will set to scheming against each other to lay the foundations for a next war.

There are big minds in every country. The men who wish to live in "freedom from fear" have this thing in their own hands. The Allied Nations will not lose this war, but many people all over the world fear that they will lose the peace following it.

WM. T. REID.

BATTLE OF BRITAIN THANKSGIVING DAY was held on September 26th. After attending a special service at St. Paul's, Their Majesties took the salute at Buckingham Palace.

SERVICE AVIATION

Royal Air Force and Fleet Air Arm News and Announcements

Awards

Fleet Air Arm

THE KING has been graciously pleased to approve the following awards:—

For bravery and skill in many hazardous air patrols against enemy submarines while operating from H.M.S. *Biter*:

Distinguished Service Medal

Temp. Ldg. Airman W. JONES.

Mention in Despatches

Temp. Lt. (A) G. L. HODGSON, R.N.V.R.
Temp. Sub. Lt. (A) J. S. BARNES, R.N.V.R.
Temp. Sub. Lt. (A) F. C. LENNOX, R.N.V.R.
Temp. Act. Sub. Lt. (A) T. E. NURSE, R.N.V.R.
Temp. Ldg. Airman D. L. MORGAN.

FOR bravery and presence of mind in rescuing the pilot from a crashed aircraft:

Mention in Despatches

Temp. Sub. Lt. (A) B. C. STUCKEY, R.N.V.R.

Royal Air Force

THE KING has been graciously pleased to approve the following awards in recognition of gallantry displayed in flying operations against the enemy:—

Distinguished Service Order

Act. Group Capt. J. H. SEARBY, D.F.C., R.A.F., No. 83 Sqn.—One night in August, 1943, this officer participated in a bombing attack on an important target at Peenemunde. Enemy fighters were extremely active over the target area, but, in spite of this, Group Capt. Searby executed his difficult task with consummate skill.

Wing Cdr. F. C. HOPCROFT, D.F.C., R.A.F., No. 57 Sqn.—Wing Cdr. Hopcroft has rendered valuable service since the commencement of hostilities. Wing Cdr. Hopcroft has undertaken very many sorties, involving attacks on a wide range of important targets. In July, 1943, he flew the leading aircraft of a bomber force which attacked a switching and transformer station in North Italy. In spite of opposition from the ground defences, the target was subjected to a determined attack from a low level.

Second Bar to Distinguished Flying Cross

Act. Sqn. Ldr. R. H. HARRIES, D.F.C., R.A.F.V.R., No. 91 Sqn.—Since being awarded the D.F.C., Sqn. Ldr. Harries has destroyed a further four enemy aircraft. In May, 1943, he led the squadron in an engagement against twelve enemy fighters. In the combat five enemy aircraft were shot down, two of them by Sqn. Ldr. Harries. During an engagement on July 18, 1943, he destroyed two and damaged another enemy aircraft.

Sqn. Ldr. A. W. Mack, R.A.F.O., No. 605 Sqn., after serving in Bomber Command, is now a night fighter pilot. For displaying great keenness and tenacity, including a flight home with one wing tip broken off, he has been awarded the D.F.C.

Bar to Distinguished Flying Cross

Act. Sqn. Ldr. H. C. GODEFROY, D.F.C., R.C.A.F., No. 403 (R.C.A.F.) Sqn.—Since being awarded the D.F.C. in May, 1943, Sqn. Ldr. Godefroy has continued to display great courage and devotion to duty. He has recently been appointed to command his squadron, which, under his inspiring leadership, has destroyed ten enemy aircraft and damaged many others. This officer has destroyed six enemy aircraft and assisted in the destruction of another. Four of his victories have been achieved since he was awarded the D.F.C.

Distinguished Flying Cross

W/O. W. L. WILSON, R.A.A.F., No. 467 (R.A.A.F.) Sqn.—For citation, see Sgt. Oliver, C.G.M.
Act. Sqn. Ldr. D. J. EVANS, R.A.F., No. 107 Sqn.
F/O. T. A. ROBERTS, R.A.F.V.R., No. 107 Sqn.
Flt. Lt. L. S. B. SCOTT, R.A.F.V.R., No. 1 Sqn.
Flt. Lt. A. E. UMBERS, R.N.Z.A.F. No. 486 (N.Z.) Sqn.
F/O. B. R. KEENE, R.A.F.V.R., No. 604 Sqn.
F/O. G. H. COWLES, R.A.F., No. 604 Sqn.
W/O. T. McN. ORMISTON, R.A.F.V.R., No. 277 Sqn.
F/O. R. TAYLOR, R.A.F.V.R.
F/O. A. HAGAN, R.A.F.V.R., No. 77 Sqn.
P/O. G. WILSON, D.F.M., R.A.F.V.R., No. 7 Sqn.
F/O. R. V. SWEENEY, R.A.F.V.R., No. 22 Sqn.
Act. Sqn. Ldr. A. M. T. NOON, R.A.F.V.R., No. 257 Sqn.
F/O. G. E. C. ARCHER, R.A.F.V.R., No. 199 Sqn.
F/O. F. S. BANNER, R.A.F.V.R., No. 243 Sqn.
Act. Sqn. Ldr. L. T. BRYANG-FENN, R.A.F.O., No. 264 Sqn.
Act. Flt. Lt. T. D. D. DUNN, R.A.F.V.R., No. 107 Sqn.
Lt. (A) J. W. NEALE, D.S.C., R.N.
Act. Flt. Lt. R. G. GOODWIN, R.A.F.V.R., No. 221 Sqn.
Act. Flt. Lt. A. F. LUCAROTTI, No. 140 Sqn.
Act. Flt. Lt. J. L. MASON, R.A.F.V.R., No. 264 Sqn.
Act. Flt. Lt. J. SINGLETON, R.A.F.V.R., No. 25 Sqn.

F/O. R. A. BANCE, R.A.F.V.R., No. 107 Sqn.
F/O. I. J. DAVIES, R.A.F.V.R., No. 609 Sqn.
F/O. J. B. SIMPSON, R.A.F.V.R., No. 107 Sqn.
W/O. W. BUTLER, No. 464 (R.A.A.F.) Sqn.
W/O. R. LILLEY, No. 89 Sqn.
W/O. H. F. W. SHEAD, No. 89 Sqn.
P/O. A. W. BURLEY, R.A.F.V.R., No. 75 (N.Z.) Sqn.
P/O. G. R. HEWLETT, R.N.Z.A.F., No. 10 Sqn.
Wing Cdr. P. W. JOHNSON, A.F.C., R.A.F., No. 49 Sqn.
Wing Cdr. W. M. PENMAN, A.F.C., R.A.F., No. 61 Sqn.
Act. Wing Cdr. P. BURNETT, R.A.F.O., No. 9 Sqn.
Act. Wing Cdr. M. WYATT, R.A.F.O., No. 75 Sqn. (N.Z.).
Act. Wing Cdr. D. W. EDMONDS, R.A.F., No. 10 Sqn.

Conspicuous Gallantry Medal (Flying)

Sgt. G. W. OLIVER, R.A.F., No. 467 (R.A.A.F.) Sqn.—One night in August, 1943, these airmen were pilot and mid-upper gunner respectively of an aircraft detailed to attack Peenemunde. The objective was successfully bombed, but, shortly afterwards, the aircraft was hit by cannon fire from an enemy fighter. The rear gunner was wounded, his turret was rendered useless and ammunition in the aircraft was set alight, while the elevator and rudder trimmers were shot away. In spite of these harassing circumstances, Sgt. Oliver fought the attacker with great determination and succeeded in shooting it down. He then turned his attention towards the fire, which was beginning to spread, and, with assistance from other members of the crew, succeeded in quelling it. Meanwhile, W/O. Wilson coolly and skilfully evaded several fighters and afterwards flew the crippled bomber to base.

Bar to Distinguished Flying Medal

Flt. Sgt. R. ROBERTS, D.F.M., R.A.F., No. 57 Sqn.—Flt. Sgt. Roberts, now on his second tour of operational duty, has flown on a large number of operational sorties. Amongst the targets he has attacked are most of the heavily defended objectives in the Ruhr and Berlin. In July, 1943, he was detailed for an attack on Cologne. On the return flight the aircraft was attacked by enemy night fighters, and the mid-upper gunner was fatally wounded. Flt. Sgt. Roberts, however, continued to press home his accurate fire until one enemy aircraft was shot down.

Distinguished Flying Medal

Flt. Sgt. W. G. ALLEN, R.A.F.V.R., No. 35 Sqn.
Flt. Sgt. D. R. BRADLEY, R.A.F.V.R., No. 35 Sqn.
Flt. Sgt. J. SANKEY, No. 10 Sqn.
Flt. Sgt. J. A. GRAHAM, R.A.F., No. 224 Sqn.
Sgt. A. H. GRAHAM, R.A.F., No. 224 Sqn.
Flt. Sgt. F. R. WILLIAMS, R.A.F.V.R., No. 223 Sqn.
Flt. Sgt. R. H. GREEN, No. 221 Sqn.
Flt. Sgt. J. QUEENBOROUGH, No. 107 Sqn.
Flt. Sgt. W. N. THORBURN, No. 107 Sqn.
Sgt. R. H. STREET, No. 262 Sqn.
Sgt. A. W. WHITMARSH, R.A.F.V.R., No. 10 Sqn.
Flt. Sgt. A. M. ANTONCICH, R.A.F., No. 200 Sqn.
Flt. Sgt. A. J. BENSON, R.A.A.F.
Sgt. R. N. HURST, R.C.A.F., No. 10 Sqn.
Flt. Sgt. H. BARTLETT, No. 40 Sqn.
Flt. Sgt. J. D. ANDERSON, No. 39 Sqn.
Flt. Sgt. R. AIREY, R.A.F.V.R., No. 51 Sqn.
Flt. Sgt. E. H. ANTHONY, R.C.A.F., No. 403 (R.C.A.F.) Sqn.
Flt. Sgt. W. A. J. APPLEBY, R.A.F.V.R., No. 10 Sqn.
Flt. Sgt. N. A. BEALE, R.A.F.V.R., No. 102 Sqn.
Flt. Sgt. A. W. T. BEVERIDGE, R.A.F.V.R., No. 101 Sqn.
Flt. Sgt. J. BOLE, R.A.F.V.R., No. 429 Sqn.
Flt. Sgt. P. D. BORCHERDS, R.A.F.V.R., No. 460 (R.A.A.F.) Sqn.
Flt Sgt. J. BOYLE, R.A.F.
Flt. Sgt. D. N. BRITTON, R.A.F.V.R., No. 83 Sqn.
Flt. Sgt. E. C. BROWN, R.A.F., No. 35 Sqn.

Roll of Honour

Casualty Communiqué No. 288.

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Of the names in this list, 111 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Sgt. H. Badge; Sgt. M. A. Bidgood; Sgt. F. Hadcraft; Sgt. E. Higgins; Flt. Lt. A. O. Jeppe; F/O. F. D. Mottram; F/O. G. B. Reid; Sgt. J. A. Spence; Sgt. R. Wood; Sgt. A. C. Wright.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. S. Bland; Sgt. G. W. Brothwell; Sgt. V. J. M. Donaldson; Sgt. A. Jacobsen; Flt. Sgt. M. W. Lofthouse; Sgt. D. C. Nelson; Sgt. R. E. Roberts; Sgt. G. Roe; Sgt. A. J. Symonds; Sgt. J. Webber.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. J. C. Allan; Sgt. A. R. Ashford; Flt. Sgt. H. Barton Smith; Sgt. L. H. Bell; Sgt. W. Bell; Sgt. E. Benning; Flt. Sgt. R. N. B. Brooker; Sgt. A. D. Chance; Sgt. S. Cookson; Sgt. O. R. O. Cotter; Sgt. D. B. Crabb; Sgt. T. R. Elliott; P/O. F. H. Ellis; Sgt. L. Fitzgerald; Flt. Sgt. F. D. Hamilton-Wilkes; Sgt. R. Harris; Flt. Sgt. L. Horn; Sgt. S. F. Howe; Sgt. J. A. Hunter; Sgt. E. A. Kelly; Sgt. J. H. W. Livesey; Sgt. R. McCulloch; Flt. Sgt. W. M. Marvin; Flt. Sgt. R. G. D. Mathews; Flt. Sgt. R. Miller; Sgt. A. J. Ottoway; Sgt. L. N. Owen; P/O. R. D. Owen; Flt. Sgt. L. M. Peterson; Flt. Sgt. D. K. Potter; Sgt. A. Quinn; Sgt. I. H. Ridge; Flt. Sgt. S. D. G. Roberts; Sgt. J. V. Robinson; Sgt. S. O. Rogers; Flt. Sgt. R. S. I. Ryder; Flt. Sgt. F. Quigley; Flt. Sgt. T. Sanderson; Sgt. J. D. Sargeant; Sgt. N. Sephton; Sgt. P. S. Sharman; Sgt. A. Short; Sqn. Ldr. W. A. Smith; Sgt. R. Spencer; Flt. Sgt. E. F. Talbot; Sgt. A. M. Temple; Sgt. A. F. Thomas; Sgt. J. E. Thomas; Sgt. R. G. Thomlinson; Sgt. J. Tunnacliffe; Flt. Sgt. K. Wakefield; Air Vice Marshal R. P. N. Witham, C.B., O.B.E., M.C.; Sgt. H. M. Williams; Sgt. W. G. Woodhouse; Flt. Sgt. L. R. T. Wright; Sgt. S. Wright; Sgt. W. E. R. Wright.

WOUNDED OR INJURED IN ACTION.—Sgt. P. B. McDonnell; P/O. G. S. Richardson.

MISSING, BELIEVED KILLED IN ACTION.—P/O. D. R. Ackerley; Flt. Sgt. W. C. Batkin; Sgt. W. Collins; F/O. G. Downey; Sgt. H. Gossop; Sgt. D. Hawcroft; Sgt. A. J. Maginnis; Flt. Sgt. J. B. Horsburgh; Sgt. A. Millband.

MISSING.—Sgt. P. D. Ablett; F/O. R. F. W. Allison; Sgt. W. F. Ardron; Sgt. I. G. Armet; Sgt. F. L. Backhouse; Sqn. Ldr. The Hon. R. A. G. Baird; Sgt. D. A. Barnfather; Sgt. G. H. Brown; Sgt. R. H. Burn; F/O. C. Burne; Sgt. G. L. Campbell; Flt. Sgt. N. P. I. Castells; Flt. Sgt. J. B. Charterr; Sgt. C. E. Clark; F/O. L. R. Crampton; Sgt. L. H. Croad; Sgt. R. H. Connor; F/O. W. A. Damsell; P/O. R. E. Dodd; Sgt. J. Donaldson; Sgt. D. W. Downes; Sgt. J. W. Doyle; Flt. Lt. J. A. P. Drummond, D.F.M.; Sgt. E. H. Eke; Sgt. R. H. Fisher; Sgt. J. Fleming; F/O. B. J. Fox; F/O. D. J. Gibson; Sgt. E. Gough; Sgt. W. McK. Grant; P/O. E. A. Haddock; Sgt. R. Harbour; F/O. W. J. J. Hitchcock; P/O. T. A. Holman; Sgt. S. F. Hughes; Sgt. V. R. Jacon; P/O. W. Jones; Sgt. E. B. Jordan; Flt. Sgt. F. E. Juggins; Sgt. R. B. L. Kent; Sgt. G. J. Kinnersley; Act. Flt. Lt. B. M. Laing; Sgt. J. L. Leader; Sgt. B. A. Lee; Sgt. D. McM. McCullock; Sgt. G. MacGregor; Sgt. R. McWilliams; Sgt. W. S. Maben; Sgt. L. E. Maidment; P/O. O. P. Marshall; Sgt. J. Marsh; Flt. Sgt. H. M. Matheson; Sgt. R. L. Mathias; Sgt. H. Mathews; F/O. P. H. May; F/O. W. J. Moorcroft; Sgt. E. R. Moore; Sgt. S. H. Mortimer; Sgt. D. A. Page; Sgt. H. Pettie; F/O. N. S. M. Reid; Sgt. M. D. Rice; Sgt. C. W. Robertson; Sgt. F. Robertson; Flt. Sgt. G. Robinson; Sgt. S. Robson; Sgt. J. W. Rooke; Flt. Sgt. N. Rosenblatt; Sqn. Ldr. K. H. Salusbury-Hughes; Sgt. I. J. Sansum; Sgt. A. S. Scott; Sgt. R. M. Shepley; Sgt. H. W. C. Simms; Sgt. W. A. St. Sinclair; Sgt. G. H. Slack; Sgt. E. Smith; Sgt. R. A. Smith; Sgt. J. Tarver; Sgt. J. A. Tyler; F/O. J. M. Vaughan; Flt. Sgt. R. A. Walker; Sgt. P. W. Wallis; Sgt. F. F. Ward; Sgt. S. H. Welch; Flt. Sgt. F. W. Whittaker; P/O. A. R. Wilden; P/O. D. Williams; Sgt. J. W. G. Wilson; F/O. H. W. Woodsend.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—A/C.2 H. Hogg.

KILLED ON ACTIVE SERVICE.—W/O. R. J. Badger; L.A/C I. G. J. Davies; Flt. Sgt. W. F. Frost; Sgt. B. Gallant; Sgt. P. R. Hope; Sgt. A. H. Iremonger; Sgt. G. C. Lawrance; Act. Sgt. W. B. K. Lewis; Sgt. R. K. MacAndrew; P/O. J. McKenna; Act. Sgt. R. R. D. Marsden; Sgt. W. L. Nicol; Flt. Lt. J. F. Page; Sgt. S. Schofield; P/O. R. S. Towler; W/O. B. C. Walmsley; Flt. Sgt. R. Wilson.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. D. Shackell.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. J. J. S. Corderoy; Sgt. W. G. Dryburgh; Sgt. A. C. Loeber; Flt. Sgt. H. H. Sawyer; Sgt. J. R. Stocker; Sgt. J. S. Wardle; Sgt. C. H. Willmot; Sgt. F. Wright.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. L. J. Knott.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. J. S. Powell.

DIED ON ACTIVE SERVICE.—A/C.1 D. Astle; A/C.1 C. E. Bozworth; Cpl. E. K. Davis; A/C.2 K. G. H. Elliott; L.A/C. W. G. Gibson; L.A/C. C. R. Harrison; L.A/C. W. McKechnie; A/C.1 N. A. Makin; L.A/C. B. K. Osborne; L.A/C. K. W. Peckham; A/C.2 R. Price; L.A/C. A. Rae; L.A/C. W. M. M. Wilkie; L.A/C. A. H. Wilson; F/O. E. S. Woodhead.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—P/O. R. Donnan; Sgt. F. Tees.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—A/CW.2 M. J. Wheeler.

Royal Australian Air Force

KILLED IN ACTION.—Flt. Sgt. R. O. C. Brett.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Act. Flt. Lt. J. W. Yarra, D.F.M.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. H. J. Fraser; Sgt. H. C. Hunt; Sgt. R. D. Macdonald; P/O. K. Millgate; F/O. J. S. Ward.

MISSING.—F/O. C. C. Godley; Flt. Sgt. N. A. B. Robinson.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Flt. Sgt. W. K. F. Merrett.

DIED ON ACTIVE SERVICE.—Cpl. W. Fleming; Sgt. E. A. Madsen.

Royal Canadian Air Force

KILLED IN ACTION.—P/O. J. M. Chalifour.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. W. A. Gillen.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. M. E. Buechler; Sgt. D. Crosthwaite; Sgt. R. Doherty; Flt. Sgt. H. A. Dunn; Act. W/O. H. A. Elliott; P/O. M. Holub; Flt. Sgt. V. A. Hugli; Flt. Sgt. G. A. Keil; Flt. Sgt. W. K. Martin; Sgt. R. C. Mutch; Sgt. M. J. Paige; Sgt. G. E. Robson; Sgt. J. H. G. Shaw; Sgt. W. O. Snow; F/O. E. W. Wallace; Flt. Sgt. R. O. Warren; Flt. Sgt. F. E. Wise; Flt. Sgt. M. Zumar.

WOUNDED OR INJURED IN ACTION.—F/O. A. A. Bishop; Sgt. H. E. Finn; F/O. A. E. Mountford; Flt. Sgt. J. A. V. Richard; F/O. D. M. Wettlaufer.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. C. McK. Goudy, D.F.M.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW REPORTED DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. A. V. Milot.

MISSING, BELIEVED KILLED IN ACTION.—P/O. C. E. Hightower; Flt. Sgt. J. S. Kelly; P/O. H. B. Parliament.

MISSING.—P/O. D. A. Campbell; Sgt. F. M. Cole; F/O. J. W. Crowley; Sgt. R. S. L. Day; Act. Flt. Lt. H. F. Ewer; Sgt. J. R. Fitch; Flt. Lt. J. H. Foy; P/O. G. K. Hignell; F/O. H. T. Huston; Sqn. Ldr. A. Lambert, D.F.C.; P/O. E. V. Lee; P/O. J. B. McDougall; Sgt. E. G. McLeod; Sgt. O. Minor; Sgt. T. J. Roche; F/O. T. W. Simpson.

KILLED ON ACTIVE SERVICE.—P/O. T. Johnstone; P/O. H. C. Miller; Sgt. D. L. R. Redfern.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—F/O. B. A. G. Campbell; P/O. J. W. Fraser; P/O. T. R. C. Irwin; Sgt. J. O. Mander.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. W. H. Lipquey; Sgt. L. J. Pearce.

MISSING.—Flt. Sgt. E. W. Saywell.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. T. M. Blakemore.

South African Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Lt. G. W. Brodziak.

MISSING, BELIEVED KILLED IN ACTION.—Lt. C. A. Halliday.

Casualty Communiqué No. 289

Of the names in this list, 100 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—F/O. R. W. Buckland; Sgt. J. M. A. Clarke; F/O. D. C. Colahan; Sgt. R. J. C. Dean; P/O. D. A. Dyball; Sgt. T. Gates; Flt. Sgt. B. F. Hall; F/O. J. Kyle; Sgt. C. W.

SERVICE AVIATION

Wing Cdr. B. R. O'B. Hoare, D.S.O., after an absence of a year while training crews for Intruder work, has returned to operational flying in this field, of which he was one of the pioneers. He is C.O. of No. 605 (County of Warwick) Sqn.

Privett; Flt. Sgt. A. L. Reynolds; Sgt. H. Scott; Sgt. A. Smith; F/O. W. R. Tidball; F/O. D. J. N. Towle; P/O. A. E. Tribbeck; Flt. Sgt. R. Watson; Sgt. A. T. Wright; Sgt. G. W. Yare.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. H. Bardsley; Flt. Sgt. M. F. Carlin; Sgt. C. G. Cave; Sgt. E. J. Chapman; Sgt. F. Greaves; Flt. Sgt. G. Green; Sgt. E. T. Jones; Flt. Sgt. J. P. R. Julian; Sgt. R. Leese; Sgt. T. McL. Millar; Sgt. J. B. Ritchie; Sgt. M. I. Sharpley; P/O. E. J. Sleigh; Sgt. G. J. Smale; P/O. J. H. Thwaits.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. R. E. Bates; P/O. R. H. Bramwell; Sgt. S. G. Brooking; Sgt. G. A. Carter; P/O. D. J. Chell; Sgt. A. Cooke; Sgt. W. R. Downing; F/O. D. Fulford, D.F.C.; P/O. G. A. Hamman; F/O. F. C. Hammond; Flt. Sgt. M. Hanna; Sgt. B. P. Norwood; Flt. Sgt. J. Howells; Sgt. R. D. Hustler; Sgt R. V. Ievers; P/O. F. G. R. Jeffries; F/O. D. St. J. Jewitt; Sgt. F. E. Kirby; Sgt. C. Lucas; Sgt. C. McCreedy; F/O. A. W. R. Morisse; Sgt. A. I. Mugford; Sgt. D. Noble; Sgt. E. C. Ringham; Sgt. A. E. Roberts; Sgt. H. A. Roberts; Sgt. L. A. Roff; Flt. Sgt. E. J. Rogers; Sgt. W. J. Salter; Sgt. P. W. Samwell; Sgt. L. P. Shepherd; Sgt. J. T. Sullivan; Sgt. J. R. N. Thorpe; Sgt. G. Tough; Flt. Sgt. R. B. Whitcombe; Act. Sqn. Ldr. B. J. Wicks, D.F.C.; Sqn. Ldr. F. C. Willis.

MISSING, BELIEVED KILLED IN ACTION.—P/O. E. Crouch.

MISSING.—Sgt. I. R. L. Acton Hill; Sgt. V. Allen; Sgt. G. G. Arnold; Sgt. S. Arthur; Sgt. L. C. Baker; Sgt. F. Barnes; Sgt. L. G. Bentley; Sgt. D. G. Bettinson; Sgt. D. G. Bingley; F/O. G. B. Blunn; F/O. W. C. Bond; Sgt. L. W. Booth; Sgt. J. D. G. Bunker; Sgt. R. Burnett; Flt. Sgt. W. Caldwell; Sgt. D. Campbell; Sgt. G. T. Causer; Act. Flt. Lt. J. R. Childs; Flt. Sgt. T. J. Clayton; Sgt. N. C. Cleaver; Sgt. B. G. A. Cooper; Sgt. D. Crome; P/O. J. A. H. Dale; Sgt. D. Daniels; P/O. P. W. Davis; Sgt. T. B. Dawson; Sgt. R. Deans; Sgt. J. Dolan; Sgt. S. E. R. Douglas; Act. W/O. R. Gafford; Sgt. J. P. McM. Garland; Sgt. C. H. Glover; Sgt. J. E. Goddard; Sgt. E. E. R. Gomershall; Sgt. P. A. Goodyear; Sgt. B. Gorman; Sgt. S. F. Hathaway; Sgt. J. Haworth; Sgt. D. H. Head; Sgt. L. S. Hill; Sgt. A. E. A. Holden; Sgt. F. W. Holmes; Flt. Sgt. D. P. P. Hurst; Sgt. N. F. Hyde; Sgt. W. G. Imrie; Sgt. L. H. Johnson; F/O. D. G. Jones; Sgt. G. Jones; Sgt. F. C. Kingston; Sgt. H. Hadfield; Sgt. J. B. Lamont; Sgt. J. Land; F/O. W. E. Leddiman; Sgt. J. Little; F/O. G. Lockie; Sgt. D. S. Loveland; Flt. Sgt. J. Lynch; Sgt. J. G. Lysaght; Sgt. G. D. McCulloch; Act. Flt. Lt. D. H. McDougall; Sgt. R. D. McKeown; Sgt. J. McLaughlin; Flt. Sgt. A. C. Mack; Sgt. H. B. Mellor; Sgt. J. W. Merrie; F/O. J. G. Millar; Sgt. R. A. W. Morse; Sgt. R. Newcombe; Sgt. G. E. Palmer; Sgt. R. W. Paulin; Sgt. W. E. Pearce; Sgt. R. Raisbeck; Sgt. B. S. Rate; Sgt. H. G. J. H. Read; P/O. F. Renton; Sgt. J. Scott; P/O. C. H. Seymour; Sgt A. Smith; Sgt. H. M. Smith; Sgt. D. E. H. Stroud; Sgt. J. Sullivan; Sgt. W. J. Thorne; Sgt. R. Wilkinson.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. A. Agar.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. H. D. Bryson; Sgt. W. C. Bull; Sgt. E. C. Buttle; Sgt. J. A. Campbell; Sgt. R. D. Carpenter; Sgt. S. H. Carter; L.A/C J. H. Clayton; Sgt. R. D. Eaglen; Sgt. K. C. Earnshaw; Act. Sgt. J. Eastwood; Sgt. K. Edwards; F/O. W. Hemmings; L.A/C. H. F. Hewitt; W/O. R. A. Hodges; Sgt. S. F. Hook; Sgt. R. G. Kings; Sgt. B. Lillyman; Flt. Lt. T. M. Niemeyer; P/O. R. H. Rutherford; P/O. G. H. I. Smith; Sgt. R. D. Smith; Sgt. G. F. A. Wix.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—P/O. E. J. Dando; Sgt. C. S. George; Sgt. L. W. Roberts; Sgt. D. A. Saunders; Sgt. T. G. Sinnett.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Flt. Sgt. T. R. Furber; Cpl. F. J. Reeve.

DIED ON ACTIVE SERVICE.—L.A/C. R. J. Baker; Cpl. D. J. Brown; L.A/C. D. B. Cameron; L.A/C. G. H. Carter; L.A/C. R. W. Castell; A/C.2 T. Fleming; Cpl. R. E. Gillard; Flt. Sgt. A. McAllan; Cpl. J. W. McKenzie; A/C.1 E. S. Mulcahy; A/C.2 D. H. Russell; Act. Cpl. J. H. Taylor; Cpl. F. H. Thorpe; Sgt. R. M. Williams; Sgt. J. F. Wilson.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. H. J. Adams; F/O. S. W. Gould; F/O. P. Hyden.

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Act. Sgt. J. Carr; P/O. W. G. Diehm; F/O. C. A. Graham.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. I. G. Brodie; Sgt. N. G. Bass; P/O. R. A. Brittingham; P/O. W. M. J. Matchett; Flt. Sgt. P. J. O. Mueller; F/O. F. C. Pinfold; Flt. Sgt. N. H. Simpson; Flt. Sgt. J. K. Swain; Sgt. T. H. Williams.

MISSING.—Flt. Sgt. R. T. Bilsby; Sgt. A. J. H. Bock; F/O. D. W. Ellis; Sgt. T. P. Laird; Sgt. N. R. Linton; Flt. Sgt. E. E. Norman; Flt. Sgt. L. G. Potts; Sgt. H. J. Richardson; Flt. Sgt. N. A. Rubens; Flt. Sgt. K. Van Waning.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. H. P. Clancy; Sgt. F. Harrison; Flt. Sgt. A. G. Potter; Sgt. E. H. B. Saker; P/O. L. G. Sellars; F/O. A. M. Shalless; Sgt. P. J. Whittard.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. B. O. K. McRoberts.

Royal Canadian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. R. L. Alexander; F/O. R. F. L. Anderson; Sgt. J. W. Dubroy; Flt. Sgt. F. McL. Macdonald; Sgt. R. W. L. Mills.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. J. J. G. Chabot; Sgt. W. C. Colwill; Flt. Sgt. W. J. Dempster; F/O. E. R. Gray; Flt. Sgt. B. J. Hardesty; Flt. Sgt. M. R. Lockwood; Sgt. R. K. McGrath; F/O. J. F. Osborne; Flt. Sgt. K. E. Stilborn; F/O. J. B. Wilson.

MISSING.—F/O. G. L. Barker; F/O. J. A. Belecky; P/O. J. E. Bemister; P/O. J. H. Borley; Sgt. B. Buckley; F/O. W. C. Davidson; F/O. R. C. East; F/O. A. R. A. Farguhar; Sgt. J. A. Firth; Flt. Sgt. J. W. Gillin; Sgt. R. O. Hunter; Flt. Sgt. L. M. Lavallee; Sgt. J. R. A. Leblanc; P/O. E. B. McCutcheon; F/O. H. W. McDonald; Sgt. R. C. McLellan; P/O. R. F. Mang; F/O. J. A. W. Melrose; Sgt. E. F. Pafker; P/O. W. G. J. Richardson; Flt. Lt. C. C. Stovel, D.F.C.; Flt. Sgt. F. R. Vance; Flt. Sgt. R. E. Vanderbeck; F/O. L. H. Walton.

KILLED ON ACTIVE SERVICE.—F/O. M. J. W. Aspinall; P/O. C. A. Crites; Sgt. R. H. Murdock.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. M. J. Bracey; Sgt. R. Sandham; Sgt. R. J. Woodruff.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. J. S. Durward; F/O. K. S. Kibble; Sgt. P. T. W. Wiltshire.

AWARDED THE D.F.C.: F/O. W. E. Armstrong, R.A.F.V.R., No. 600 Sqn., has taken part as observer in numerous night sorties and has assisted in the destruction of four enemy aircraft.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. A. D. Glover; Act. Flt. Lt. B. Martin; F/O. K. Tahiwi; Sgt. W. S. Thompson.

MISSING.—P/O. C. Baker; F/O. S. M. Hunt; Flt. Sgt. I. Kippenberger.

South African Air Force

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Lt. V. Mundell; 2/Lt. C. Southwood.

Casualty Communiqué No. 290

Of the names in this list, 115 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Sgt. A. M. Griffiths; Sgt. C. L. B. Janes.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. J. S. Aird; Sgt. H. F. Barber; Sgt. T. A. Berwick; F/O. L. V. Carrington; Sgt. R. W. Darlington; Flt. Sgt. E. J. W. Davis; P/O. L. J. A. Graham; Sgt. H. J. Kendrick; Sgt. W. G. A. Mitchell; Sgt. A. W. Robertson; F/O. P. G. Solon; Sgt. J. A. Texter; F/O. R. D. Woods.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Lt. A. J. Andrews, D.F.C.; Sgt. F. B. Andrews; Sgt. E. A. Blore; Flt. Sgt. J. Brook; Sgt. G. E. H. Ceeney; P/O. I. G. E. Davidson; F/O. G. H. Dean; P/O. J. A. Denning; F/O. H. Duncan; Sgt. G. F. Eldridge; F/O. R. H. D. Esheiby; Sgt. C. D. Evans; Sgt. M. A. Goldstein; Act. Flt. Lt. W. M. R. Griffin, D.F.C.; Sgt. D. G. Guy; Sgt. G. McM. Hair; Sgt. G. Hayes; P/O. K. F. G. Inskip; Sgt. J. M. Jones; Flt. Sgt. D. C. Lawton; F/O. G. R. Leahy; Sgt. R. F. Lowrie; W/O. H. McColl; F/O. A. M. MacLay; Sgt. K. Magness; Sgt. D. F. Meade; Sgt. R. D. Morris; Sgt. L. Noble; Sgt. D. R. Riley; Flt. Sgt. A. D. Ross; Sgt. F. R. G. Simkins; Sgt. K. E. Slade; Flt. Sgt. D. G. Smith; P/O. T. S. South; Sgt. G. H. Stone; Sgt. R. Waudby; F/O. J. A. White; Sgt. A. L. Wood; Sgt. J. Wood; Sgt. J. -H Worrow.

WOUNDED OR INJURED IN ACTION.—Sgt. W. O Brokensha; Sgt. J. Moreman; Sgt. H. W. Mead.

MISSING, BELIEVED KILLED IN ACTION.—Act. Sqn. Ldr. F. H. Bowden, D.F.C.; F/O. C. H. Buchanan; Sgt. A. Carter; Sgt. D. W. F. Cottrell; Sgt. D. W. Covell; Sgt. T. F. Cummins; F/O. A. J. Derrick; F/O. R. H. W. Hogarth; Sgt. J. Raw; Sgt. G. Rowan; Sgt. M. A. Smith; Sgt. M. K. Smith; Sgt. K. F. W. Stevens; P/O J. H. Wotherspoon.

MISSING.—Sgt. R. G. Amos; Flt. Sgt. K. Archer; F/O. J. D. Arthurell; P/O. G. Ashplant F/O. N. Avery; P/O. L. D. Blomley; Sgt. J. L. Brazil; F/O. L. H. Burn; Sgt. R. A. Burrell Sgt. J. W. Buxton; Act. Sqn. Ldr. G. R. Carpenter; Act. Flt. Lt. J. N. Cartwright; Sgt W. H. R. Clark; F/O. R. Clarke; Sgt. W. C Colley; Sgt. E. T. Cook; Flt. Sgt. P. Crawforth; P/O. D. T. Davies; Sgt. R. E. Dexter Sgt. B. P. Dowthwaite; Sgt. D. Enoch; F/O I. D. C. Evans; P/O. A. W. Farquharson, D.F.M. Sgt. J. R. Fradley; Sgt. K. P. Froud; Flt. Sgt G. Harper; Flt. Sgt. L. Harrop; Flt. Sgt. P. H Hartley; Sgt. P. Holmes; Sgt. D. A. Horsley; Flt. Sgt. A. E. Jeffery; F/O. W. T. H. Jennings; F/O. J. Johnston; Sgt. J. B. King; Sgt. C. A Land; F/O. E. T. D. Lees; F/O. D. W. Licquorish; Flt. Sgt. J. A. R. McDonald; F/O. G. E. Mann; F/O. W. A. P. Manser; Sgt. R. A. Mitchell Sgt. G. H. Newbolt; Sgt. S. A. J. North; Sgt G. C. Peggs; P/O. L. G. Phillips; Flt. Sgt W. F. Pyle; Flt. Sgt. H. J. A. Reid; Sgt. A. J. A. Reynolds; Sgt. F. J. Richardson; Sgt. R. McD. Ronaldson; Sgt. R. V. Slater; F/O. D. J. Slaughter; Sgt. J. R. G. Smith; Sgt. W. H. J. Smith; Sgt. S. Speddings; F/O. E. M. Stanyon; Sgt. H. H. Stockley; P/O. S. C. Sykes; Sgt. K. C. Tate; Act. Wing Cdr. A. M. Taylor, D.F.C.; Flt. Sgt. E. J. Thorne; Sgt. J. H. Thornton; F/O. J. S. Treseder; Sgt. J. R. Tully; Sgt. A. A. Turner; F/O. A. B. Welch; Sgt. A. G. Wells; P/O. F. Whitlock.

KILLED ON ACTIVE SERVICE.—A/C.2 H. R. Astill; L.A/C. A. T. G. Atkins; Sgt. J. Beanland; P/O. D. J. Bleakley; Sgt. N. Darby; P/O. J. Grundy; P/O. G. E. Holmes; F/O. M. E. Lawton; Wing Cdr. B. F. S. Leslie, D.S.C., D.F.C., A.F.C.; Sqn. Ldr. J. A. Meade, D.F.C.; Flt. Sgt. K. Paterson; Sgt. L. A. Penfold; Sgt. G. L. F. Philcox; Sgt. S. A. Snow; Flt. Sgt. R. T. Steed; P/O. Sgt. F. Stevenson; Flt. Sgt. F. B. Vause.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. J. Horsley.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. W. J. Brown; W/O. B. R. M. Burnham; Sgt. F. J. Frayne; Sgt. H. M. Grey; Flt. Sgt. W. J. Lovejoy; L.A/C. W. L. Riley; Sgt. W. A. Smith; Sgt. P. Y. Thomson; Sgt. R. Walker.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. A. Lamont; L.A/C. P. S. Rattray; Flt. Sgt. J. S. Teasdale; Cpl. D. T. Thomas.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. J. Fleming; L.A/C. R. King; Flt. Sgt. A. H. McCue.

DIED ON ACTIVE SERVICE.—Sqn. Ldr. A. C. Bawtree; Flt. Sgt. W. W. Brind; L.A/C. G. M. L. Brown; L.A/C. H. D. Brown; Flt. Lt. R. Burton-Fanning; Cpl. F. Dodd; Sgt. P. C. E. Goodman; Cpl. J. T. Halligan; L.A/C. S. Heron; A/C.1 A. J. Laws; L.A/C. S. Lehrer; Sgt. D. G. Oney; Cpl. A. Parker; A/C.1 H. G. L. Price; Cpl. J. Shepherd; L.A/C. S. Walker; L.A/C. C. G. Wright.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—L.A/C. W. J. C Breedon.

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. M. H. I. De Cosier; Act. Flt. Lt. W. Martin, D.F.C.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. A. E. Crossley; F/O. T. A. Edgoose; Sgt. C. G. D. Hains.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW REPORTED KILLED IN ACTION.—Sgt. P. F. Burroughs.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. R. Feakes; Flt. Sgt. W. A. Gunning; Sgt. R. V. Hombsch; Sgt. G. F. Regan.

MISSING.—Flt. Sgt. E. F. Baker; Flt. Sgt. J. T. Buchanan; P/O. J. A. B. Cooper; Flt. Sgt. D. E. E. Dean; P/O. J. Fletcher; Flt. Sgt. P. A. George; P/O. A. L. Gibbons; P/O. K. H. Hoffman; Flt. Sgt. R. P. Holmes; Flt. Sgt. R. W. Munson; Sgt. R. Quine; P/O. A. P. Reed; Flt. Sgt. B. S. Reilly; Flt. Sgt. R. G. Rev.

KILLED ON ACTIVE SERVICE.—Sgt. J. H. Hart; P/O. A. J. Slaughter; F/O. H. A. Stevens; Flt. Sgt. W. C. Taverner.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. H. G. Wilson.

Royal Canadian Air Force

KILLED IN ACTION.—F/O. J. F. X. J. Bittner; P/O. J. C. Kennedy; Sgt. J. E. McGrogan; Sgt G. W. A. Patterson; Sgt. W. Trofanenko.

PREVIOUSLY REPORTED MISSING, BELIEVED

SERVICE AVIATION

KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. S. Feinstein; Sgt. J. L. R. Keough; Sgt. R. L. Wakelin.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. C. R. Bee; Flt. Sgt. H. Broom; Sgt. F. E. Davidson; Sgt. H. M. Lane; Sgt G. J. H. McElroy; Sgt. J. L. O'Grady; Flt. Sgt T. E. Powell; Sgt. W. D. Probert; P/O. J. Woolford.

WOUNDED OR INJURED IN ACTION.—F/O. J. I. McKay.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. H. C. Jordan.

MISSING.—F/O. J. G. McCormick; Sgt. H. J. Morris; P/O R. M. H. Purdon; Sgt. W. E. Ramsay; Sgt. L. F. C. Stewart; P/O. D. B. Surrette; F/O. H. G. Taverner; F/O. H. A. Taylor; P/O. L. A. Wood.

KILLED ON ACTIVE SERVICE.—Sgt. R. C. Babb; F/O. J. H. Benton; F/O. G. V. Gibson; F/O. H. G. Spencer; F/O. C. N. Wilcox.

WOUNDED OR INJURED ON ACTIVE SERVICE.—F/O. D. F. Quirt.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. K. B. Malin.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. J. A. Logan; Sgt. W. G. H. White.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. E. L. D. Ashwin; Sgt. V. A. O. Dimock; F/O. G. H. Jacobson; P/O. W. D McAlpine; Sgt. W. F. Stokes; Sgt. D. N. Tonkin; F/O. P. C. Whitwell, D.F.M.

MISSING.—Flt. Sgt. R. G. J. McKenzie; F/O. F. D. Matheson.

KILLED ON ACTIVE SERVICE.—Sgt. C. E. Blanchette; Sgt. C. I. Humphrey; P/O. F. A. Piercy.

DIED ON ACTIVE SERVICE.—Flt. Sgt. H. A. Laing.

South African Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Act. Sgt. R J. Behrens; 2/Lt. C. R. Bruton-Simmonds; Lt. W. J. Duplessis; Sgt. H. G. Hilton-Barber; Lt. E. W. Hudson; Lt. E. W. L. Popham; Lt. H. H Roberts; Sgt. R. J. Stringer; Lt. J. G. H. Wilmot.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Lt. D. B. G. Bailey; 2/Lt. J. M. Bredenkamp; Lt. S. V. Coleman; Maj. A. M. Colenbrander; Act. Sgt. B. S. Clutterbuck; Lt. N. M. Gunyon; Lt. A. D. Hinton; 2/Lt. D. C. James; Lt A. J. Lawrens; Lt. H. S. McMaster; Act. Sgt. G. E. Nichols; 2/Lt. J. R. R. Pryde; Lt. M. H. T. Smuts; Act. Sgt. E. S. Vanderyerwe; Flt. Sgt. J. Van Loggerenberg.

WOUNDED OR INJURED IN ACTION.—Lt. S. B. Whittle.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Act. Flt Sgt. F. R. Childe; Lt. T. Gorsling.

PREVIOUSLY REPORTED MISSING, NOW REPORTED DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—2/Lt. W. B. Dalgleish.

MISSING.—Lt E. P. Hamilton; 2/Lt. Hodkinson; Flt. Sgt. D. Phelan.

KILLED ON ACTIVE SERVICE.—2/Lt. G. M. Williams; Lt. S. A. Yaldwyn.

Casualty Communiqué No. 291

Of the names in this list 101 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Sgt. M. H. C. Ashdown; Sgt. T. L. Buttery; Sgt. S. Davies; Sgt. E. C. Denyer; Sgt. D. J. Dolby; Flt. Sgt. F. N. Hanish; P/O. J. W. Hindmarsh; Sgt. J. Martin; Sgt. E. A. Murray; Sgt. R. J. Sparke; F/O. J. M. Tait; Act. Sqn. Ldr. J. S. Taylor, D.F.C.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. C. F. Budgen; Sgt. R. W. J. Crooks; Sgt. J. H. W. De Silva; Sgt. G. Kilpatrick; Sgt. M. F. Natham; Sgt. T. B. Treble; Sgt. P. A. Warren.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. B. D. Allen; Sgt. O. K. Barclay; Sgt. R. A. Barnes; Sgt. J. Bennett; Sgt. R. Bentley; Sqn. Ldr. J. C. Carver, D.F.C.; Flt. Sgt. E. Crowe; Sgt. H. F. Dell; Flt. Sgt. W. G. Drayton; Sgt. W. R. St. G. Fairfield; Sgt. C. A. Farrimond; Sgt. R. B. L. Flint; Sgt. G. H. Foster; Flt. Sgt. R. A. Francis; Act. Sgt. A. Gander; Sgt. W. H. Good; Sgt. L. D. Graves; P/O. D. L. Hemming; Sgt. R. N. Hildred; P/O. J. A. C. Kite; Sgt. W. Leadbetter; Flt. Sgt. J. S. Macka; Sgt. C. A. Maw; P/O. F. Maxfield; F/O. L. L. Mink; Sgt. W. C. Morgan; Sgt. R. J. Mumford; Sgt H. P. Norcross; P/O. L. W. O'Hara; F/O. J. Owen; F/O. T. L. Parker; Sgt. W. J. Parnell; Sgt. J. G. Phillips; Sgt. D. F. Reeve; Flt. Sgt. R. L. S. Ritchie; P/O. D. W. Rowe; Sgt. J. R. S. Scott; Sgt. W. Shanks; Sgt. J. A. Sharp; Sgt. A. G. Sherrard-Smith; Sgt. D. T. Simpson; Sgt. E. N. Smith; Sgt. E. G. Souter; Sgt. C. Stainton; Sgt. J. O. Straffen; Act. Flt. Lt. T. F. Tyrrell; Sgt. J. M. Watt; Act. Wing Cdr. J. M. White.

WOUNDED OR INJURED IN ACTION.—Sgt. W. G. Stimpson.

MISSING, BELIEVED KILLED IN ACTION.—Sgt R Broadley; Sgt. J. H. Curry; Sgt. R. G. Goff; Sgt. R. K. Harrold; Sgt. D. G. L. Jenkins; Sgt. J. L. Osborne; Sgt. R. W. Threadgold; Sgt. W. G. Trowbridge; Sgt. W. M. Ward; Sgt. R. A. W. Wilkinson.

MISSING.—Sgt. E. S. Barber; P/O. K. A. Barr; Sgt. G. Beam; Sgt. E. N. Bird; F/O. A. P. Blackie; Sgt. E. R. Bray; F/O. F. T. Brown, D.F.C.; Sgt. E. J. Cahill; Sgt. A. Clark; Sgt. D. A. Clark; F/O. J. Clark, D.F.M.; F/O. J. S. Clements; Sgt. A. Cloud; P/O. A. H. Coates; F/O. J. S. Cole; Sgt. R. D. Copley; Sgt. E. S. Crabbe; Sgt. J. Crowther; F/O. J. D. Dunne; Sgt. F. A. J. Edwards; W/O. F. H. H. Elliott; F/O. S. J. Elphick; F/O. R. N. Farrow; Flt. Sgt. G. B. Fielder; Sgt. W. H. Garvin; Flt. Lt. H. Gore; Flt. Sgt. R. Grainger; Sgt. S. J. Greer; F/O. R. I. Hargreaves; Flt. Sgt. H. Hay; Sgt. A. Hillam; Sgt. H. Holman; Flt. Lt. G. Hood; Sgt. W. J. Hood; Sgt. W. A. L. Huddy; Act. Flt. Lt. C. H. J. Hunt; Sgt. R. J. Hutchings; Sgt. E. J. Jones; Sgt. T. B. Jones; Flt. Sgt. E. F. V. Kidd; Sgt. K. R. Larkin; Sgt. R. Lobb; F/O. E. Mawson; Wing Cdr. P. R. May, A.F.C.; Sgt. G. Miller; Sgt. A. Milligan; Sgt. G. E. Milton; Sgt. R. C. Mitchell; Sgt. E. Morris; Flt. Lt. T. D. Neal; Sgt. H. Nichol; Sgt. H. S. Norrington; Sgt. W. O'Brien; Sgt. H. Owen; P/O. D. V. Park; P/O. C. E. Parkin; F/O. R. E. Parsons, D.F.M.; Sgt. N. E. Philbrick; Sgt. C. E. Radford; Sgt. R. D. Raven; Sgt. W. Reid; Sgt. J. Ritchie; Act. Flt. Lt. W. B. Rogers; L.A/C. S. Rushin; P/O. J. Sarginson; F/O. J. L. Seymour; P/O. J. S. Smyth; F/O. A. D. S. Snell; F/O. E. S. A. Sniders; F/O. V. C. J. Steer; Sgt. H. C. Stevenson; Sgt. J. Stewart; P/O. L. E. Stubbs; Flt. Sgt. C. E. Tardif; Sgt. L. A. Taylor; Sgt. G. C. Thompson; Sgt. J. S. Tubb; F/O. W. M. R. R. Urquhart; Sgt. W. C. Wallace; Flt. Sgt. R. Walter; Act. Wing Cdr. P. G. B. Warner, D.S.O.; F/O. A. G. McA. Watson; P/O. D. M. Weddell; Flt. Sgt. G. W. Wilkins; Flt. Lt. A. B. Wilkinson; Sgt. C. Willson; Sgt. R. J. Wyatt-Matthews.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. W. L. Haslam; Sgt. C. G. Hirst; Sgt. D. G. Leverton; Sgt. R. C. Parkinson.

KILLED ON ACTIVE SERVICE.—F/O. P. E. Adkins; Sqn. Ldr. P. Brandon-Trye; Flt. Sgt. D. Breslin; W/O. J. W. Heard; Flt. Sgt. D. Dean; Act. Sgt. W. A. Dent; Flt. Lt. A. E Downing; P/O. S. Dykes; L.A/C. C. D. Inglebey; Sgt. T. H. Loftus; Act. Group Capt. R. E. Down; Wing Cdr. A. W. S. Matheson; Flt. Sgt. L. Murray; Group Capt. R. V. M. Odbert; A/C.1 H. A. Peters; F/O. M. R. Royde; Sgt. W. R. Tee; Sgt. I. T. Thomson; Sgt. A. R. Thorougood; Flt. Lt. E. G. Titley; Sgt. J. W. Twelftree.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—A/C.2 C. Gutteridge; Sgt. T. H. Lawton; Sqn. Ldr. H. H. B. Mould.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. P. S. Sutton.

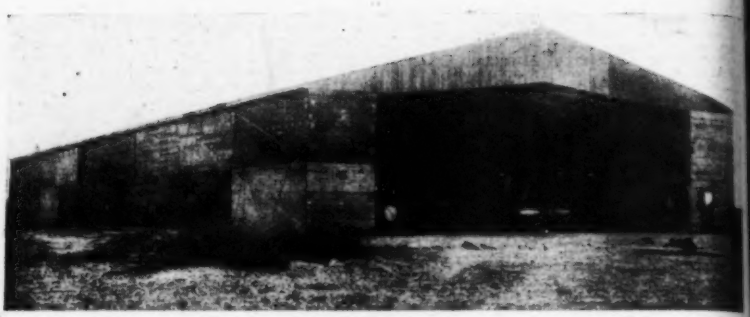
PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW REPORTED KILLED ON ACTIVE SERVICE.—L.A/C. R. Crawshaw; L.A/C. H. R. J. Partoon.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. J. A. Cade; F/O. R. A. Dawe; L.A/C. D. James; L.A/C. C. F. West.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. K. R. Allen; L.A/C. H. S. Fisher; L.A/C. R. Tunstall.

DIED ON ACTIVE SERVICE.—Cpl. C. Allison; L.A/C. W. H. Andrew; Cpl. H. V. S. Brown; Cpl. E. A. Chamberlain; L.A/C. F. R. Gentle; Cpl. R. C. P. Griffiths; A/C.1 J. W. E Hagley; Cpl. S. T. Hewitt; A/C.2 F. Hill; A/C.1 L. A. Keeble; Sgt. J. T. O'Connell; F/O. H. A. Tapper; A/C.1 E. Watson; Sgt. G. N. Yeoman.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. T. H. Harvey; Flt. Sgt. F. S. Hope; Sgt. R. J. Jackson; Sgt. W. H. G. I. Moore; Sgt. A. D. Smith.



STILL HOUSING AIRCRAFT: The R.A.F. in India are turning the crates in which their machines arrive into hangars. This one took 60 crates.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—A/CW.2 M. Brown; L.A/CW. M. Hill.

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. R. F. Hammond, D.F.M.; Sgt. R. J. Munro; F/O. F. E. Parsons; F/O. J. F. Summers; F/O. E. W. Wall.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. D. McN. Thomson.

MISSING.—Flt. Sgt. F. P. Bayly; F/O. A. F. Betteridge; F/O. J. H. Davie; Flt. Sgt. D. B. Giles; Flt. Sgt. J. E. Goddard; Flt. Sgt. B. J. Lewis; Flt. Sgt. L. W. Moon; Flt. Sgt. L. B. York.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. J. W. L. Underhill.

Royal Canadian Air Force

KILLED IN ACTION.—P/O. F. D. Butland; Sgt. H. C. Dawson; P/O. R. B. Foster.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. J. L. Dunlop; Flt. Sgt. A. R. Juneau; F/O. C. A. McRoberts; F/O. H. A. Westhaver.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. A. B. Burgess; Flt. Sgt. W. D. McL. Embree; Flt. Sgt. R. E. Gorman; Sgt. K. S. Gunning; F/O. F. G. James; Sgt. W. E. Johnson; Flt. Sgt. J. E. Land; Sgt. W. W. H. Lavers; Flt. Sgt. G. F. McHugh; F/O. W. H. Matthews, D.F.C.; F/O. B. J. Moffatt; Flt. Sgt. D. L. Morrow; F/O. V. B. Ray; Flt. Sgt. W. B. Reynolds; Sgt. T. H. Short; Sgt. L. J. Tighe.

WOUNDED OR INJURED IN ACTION.—P/O. W. J. Moss.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. A. Cleveland; Flt. Lt. R. H. Deugo; F/O. K. McL. Johnston.

MISSING.—Sgt. R. N. Barlow; F/O. A. S. Bellingham; P/O. G. R. Burton; Sgt. J. M. G. Cantin; F/O. R. F. Coulson; P/O. R. M. Furman; Act. Flt. Lt. L. C. Gosling, D.F.C.; Sgt. T. A. Ivey; Sgt. S. Harrison; Sgt. A. S. Hopping; Sgt. H. A. Huntington; Sgt. J. L. L. Janisse; P/O. G. F. McCleary; Sgt. R. B. MacKenzie; W/O. W. L. Sleeman.

KILLED ON ACTIVE SERVICE.—F/O. F. J. Daws; Flt. Sgt. J. W. Hoba; Sgt. R. H. Jarvis.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—P/O. S. F. Fairbairn.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. H. C. Ballinger; Sgt. E. W. Chessor; Sgt. L. D. Dawdy.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. J. A. Adams.

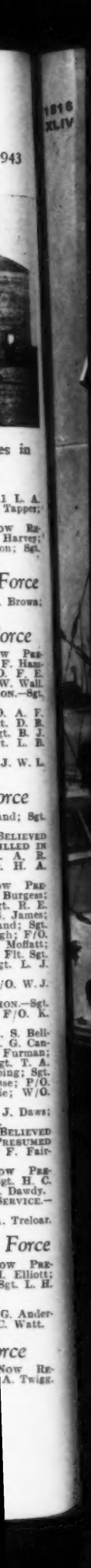
DIED ON ACTIVE SERVICE.—F/O. H. A. Treloar.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. M. H. Elliott; Sgt. R. J. Gould; F/O. R. S. Longuet; Sgt. L. H. Martin; F/O. R. L. Meredith.

MISSING.—Flt. Sgt. P. F. Watson.

KILLED ON ACTIVE SERVICE.—F/O. J. G. Anderson; Flt. Sgt. J. W. Hughes; F/O. E. C. Watt.

South African Air Force

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Air Sgt. R. A. Twigg.